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MORRISON RUN PROJECT

Bradford Ranger District, Allegheny National Forest

Warren and McKean Counties, Pennsylvania

Mead Township (Warrants 574, 591, 2430, 2590, 3721, 3724, and 3725;
Lots 14, 16, 17 and 18)

Hamilton Township (Warrants 2376, 3701, 5571, 5572, 5573, 5574,
5575, and 5577; Lots 2, 3, 4, 5, 10, 15, 19, 22 and 123)

Corydon Township (Warrants 3721, 3705, 3714, 3731, 3724, and 4910;
Lots 6, 7, 8, 9, 10, 11, 12 and 13)

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EXECUTIVE SUMMARY

The U.S. Forest Service proposes the Morrison Run Project on the Bradford Ranger District of the Allegheny National Forest. The project boundary is roughly defined by the Allegheny Reservoir to the west, north, and south, and private land to the east. This Environmental Assessment (EA) describes the project area, identifies the purpose and need for the proposed action, provides detailed information on the alternatives, and compares the effects of implementing the proposed activities.

Chapter 1 describes the purpose and need for the project based on the desired conditions of the area and identifies activities proposed to address these needs. The proposed action includes commercial timber harvesting, noncommercial vegetation treatments and activities to improve transportation, recreation and wildlife habitat in the project area. Chapter 2 describes the scoping process and the three alternatives analyzed in detail for the Morrison Run project, including one (Alternative 3) that was developed in response to issues identified during the project scoping process.

Chapter 3 describes the physical, biological and social conditions of the project area and compares the direct, indirect and cumulative effects of the alternatives on specific resources. Alternative 1 did not achieve the project's purpose and needs for most resources and would result in continued problems with non-native invasive plants, forest health issues and stream conditions that do not meet the desired condition for the area. Alternatives 2 and 3 had very similar effects for most resources and neither is expected to have substantial negative effects on resources in the project area. Alternative 2 would better address stand decline due to beech bark disease and would improve opportunities for dispersed recreation in those areas. Alternative 3 would avoid short-term impacts on recreation from timber harvests along two hiking trails but would not fully address forest health issues that require creating temporary openings exceeding 40 acres. Alternatives 2 and 3 would have very similar effects on wildlife habitat and forest fragmentation; private oil and gas development is the primary cause of reasonably foreseeable fragmentation, habitat conversion and other resource concerns in the project area. Selection of either Alternative 2 or 3 is expected to result in economic benefits, whereas Alternative 1 would not contribute goods and services to the regional economy. Despite the potentially large impact of reasonably foreseeable future private oil and gas development in the project area, the cumulative effects of the activities proposed in Alternatives 2 and 3 are not expected to exceed effect thresholds identified in regulations or the Forest Plan for any of the resources analyzed.

CHAPTER 1: PURPOSE AND NEED AND PROPOSED ACTION

Introduction

The Forest Service has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) of 1969 and other relevant laws and regulations. This EA discloses the potential direct, indirect, and cumulative effects resulting from the three alternatives considered in detail for the Morrison Run project.

Allegheny National Forest Land and Resource Management Plan

The Allegheny National Forest (ANF) Land and Resource Management Plan (Forest Plan) provides a 10 to 15 year strategy for managing forest resources (USDA-FS 2007a). All applicable laws, regulations, policies, and national and regional direction, as detailed in the Forest Service Manual and Handbook, are part of Forest Plan directions.

The Forest Plan is organized into four parts:

- 1) Vision: contains the forest niche statement, the desired condition of the ANF, and additional goals for the ANF;
- 2) Strategy: contains objectives, an estimate of management activities and funding, the allowable sale quantity, special designations, a summary of the management areas (MAs), suitable uses and activities, and monitoring strategy;
- 3) Design Criteria: contains forest-wide standards and guidelines; and,
- 4) Management Area Direction: contains the contribution to the desired condition, objectives, suitable uses and activities, and design criteria specific to each MA.

The Forest Plan is permissive in that it guides, but does not mandate, projects and activities on the ANF. Broader goals and objectives are realized through the development and completion of site-specific activities such as those proposed in the Morrison Run Project. The standards defined in the Forest Plan set parameters within which projects must take place (16 U.S.C. 1604(i)). If a project cannot be implemented in accordance with the standards, the plan must be amended before the project can proceed (USDA-FS 2007a, p. ROD-4).

Background and Overview of the Decision Area

The Morrison Run project area is located on the Bradford Ranger District of the ANF. The project boundary encompasses 19,705 acres, including 19,098 acres of National Forest Service land and 607 acres of private land. It is roughly defined by the Allegheny Reservoir to the west, north, and south, and private land to the east (Map 1, Project Area and Vicinity). It includes National Forest System lands in Warren Co. in Mead Township (Warrants 574, 591, 2430, 2590, 3721, 3724 and 3725 and Lots 14, 16, 17 and 18) and in McKean Co. in

Hamilton Township (Warrants 2376, 3701, 5571, 5572, 5573, 5574, 5575 and 5577 and Lots 2, 3, 4, 5, 10, 15, 19, 22 and 123) and Corydon Township (Warrants 3705, 3714, 3721, 3724, 3731 and 4910 and Lots 6, 7, 8, 9, 10, 11, 12 and 13). The NFS lands in the Morrison Run project were designated by the Forest Plan as Management Area (MA) 2.2 Late Structural Linkages (10,562 acres, 55% of project area), MA 3.0 Even-Aged Management (8,451 acres, 44% of project area) and MA 7.1 Developed Recreation Areas (83 acres, <1% of project area). Chapter 3 provides a more detailed description of the existing condition of the Project Area.

Relationship to Other Documents

The analysis for this project is tiered to the Forest Plan Final Environmental Impact Statement (FEIS) (USDA-FS 2007b). Tiering is described in the Forest Service Handbook (FSH) as a process of summarizing and incorporating by reference other environmental documents of broader scope to eliminate repetitive discussions and to focus on the actual issues ripe for decision (FSH 1909.15, Chp. 42.1). The Forest Plan FEIS documents the Forest-level effects of implementing management activities on the ANF, and the actions proposed for the Morrison Run project were designed to achieve the Forest Plan goals and objectives for the project area. The scope of this EA is limited to addressing issues and possible environmental consequences of the activities proposed in this project; it does not address decisions made at higher levels.

The following Forest-wide FEISs and Records of Decision have approved activities within the project area:

Understory Vegetation Management on the Allegheny National Forest (USDA-FS 1991a) herbicide application and mitigation measures are outlined on pp. 5-1 to 5-4, D-1 to D-12;

Decision memo for aerial fertilization on the Allegheny National Forest (USDA-FS 1991b);

Allegheny National Forest Final Environmental Impact Statement for Vegetation Management on Electric Utility Rights-of-way (USDA-FS 1997).

Most of the Morrison Run project area has not been actively managed for several decades. Past project-level decisions that affected the current conditions within the Morrison Run area include Wolf Pigeon EA (1997), Prescribed Fire EA (2003), Chappel Blowdown CE (2004) and the Lab Diversity Study Project. These documents are available at the Bradford District Ranger Office. The previously approved activities from other projects that have not been implemented are listed in Appendix A and are considered in the cumulative effects analysis in Chapter 3.

Purpose and Need

The Forest Plan describes the overall desired conditions for the ANF (USDA-FS 2007a, pp. 10-12), goals and objectives related to specific resources (pp. 12-21), and descriptions of each Management Area (MA 2.2 and 3.0 p. 22; MA 7.1 p. 27). The purpose of this project is to meet these Forest Plan goals and objectives and achieve the desired conditions for the Management Areas in the Morrison Run Project Area.

The Interdisciplinary Team compared the existing conditions for specific resources or geographic areas with the desired conditions to identify the following purposes and needs for the activities proposed in the Morrison Run Project:

- 1) **There is a need to develop and enhance the seedling, shrub, and herbaceous diversity to improve structural conditions as described for each Management Area (USDA-FS 2007, pp. 14, 19).** Within the project area, approximately 99% of stands in MA 2.2 and over 90% of stands in MA 3.0 are older than 50 years. Without active management, stands will continue to move into older age classes and the area will not meet MA objectives for percent of forest in the early structural age class (USDA-FS 2007a, pp. 109 and 113).
- 2) **There is a need to manage late structural stands and conditions within the project area as described for each Management Area (USDA-FS 2007, pp. 14, 19, 109, 113).** Management for late structural habitat is a primary objective in MA 2.2 and contributes to habitat diversity in MA 3.0. Treatments that emphasize late structural features such as large snags and down woody material will increase the presence of late structural habitat within the project area and will benefit wildlife species such as the northern goshawk, which is a mature forest species (USDA-FS 2007a, pp. 20, 80, and 84).
- 3) **There is a need to provide quality hardwood products (USDA-FS 2007a, p. 14).** The Forest Plan identifies providing high quality, hardwood sawtimber from land suitable for harvest at a sustainable level to meet multiple resource objectives as a Forest-wide goal for vegetation management.
- 4) **There is a need to manage both existing and future forest health by addressing insect and disease issues within the project area (USDA-FS 2007a, pp. 15, 93, 109, 113).** Many stands within the project area have undergone significant mortality of American beech in the over-story that has given rise to mid-story and understory vegetation dominated by beech brush, striped maple, and hayscented and New York fern. There is a need to regenerate these poorly stocked stands. Additionally, numerous defoliating events and a legacy of over-browsing by deer have impacted not only stands with high beech mortality, but also all other forest types within the project boundary (USDA-FS 2007a, p. 15). Planting conifer species other than hemlock increases resiliency to the threat of hemlock woolly adelgid, which has not been found on the ANF but is a growing forest health concern in the eastern United States.
- 5) **There is a need to regenerate or improve oak stands (USDA-FS 2007a, pp. 19, 20, and 109).** A variety of regeneration treatments are needed to ensure the long term perpetuation of the oak forest community within the project area. There is a need to reintroduce fire into fire-adapted oak ecosystems to conserve regional biodiversity and sustain ecosystem structure and function (USDA-FS 2007a, p. 14). To improve wildlife habitat for species that prefer mature oak, there should be an emphasis on sustaining oak mast crops and large den trees in the long-term through a combination of

thinning, release, prescribed burn, and regeneration treatments (USDA-FS 2007a, pp. 20 and 109).

- 6) **There is a need to maintain and enhance transportation systems.** The Forest Plan calls for a transportation system that allows management of NFS lands and provides public access while having minimal adverse effects on ecological processes and ecosystem health, diversity and productivity (USDA-FS 2007a, pp. 16, 21, and 61).
- 7) **There is a need to reduce existing sedimentation and maintain, restore, or improve soil quality, productivity, and function (USDA-FS 2007a, p. 14).** Management activities should be conducted in a way that minimizes long-term loss of inherent soil quality and function. In-stream log structures placed at specific sites along streams can help stabilize eroding banks and trap sediment and organic debris.
- 8) **There is a need to provide diverse and specialized habitats across the landscape to benefit wildlife populations and enhance wildlife habitat to provide desired cover and forage conditions (USDA-FS 2007a, pp. 14, 15, 20, and 80):** Specialized habitat and inclusions should be managed to benefit game and non-game species, species with viability concerns, or unique ecological communities. Examples include creation of basking areas for timber rattlesnakes, increasing vertical structure and understory diversity for song birds and conserving and enhancing native plant diversity, abundance, and distribution across the ANF.
- 9) **There is a need to restore and enhance stream processes and aquatic habitat diversity for brook trout and other headwater stream fishes. Headwater streams on the ANF should have between 75 to 380 pieces of large wood per mile of stream (USDA-FS 2007a, p. 14).** Stream area habitat should be comprised of 35 to 65 percent pool and slow-water habitats, which is important for aquatic organism survival and propagation (USDA-FS 2007a, p. 11). Habitat surveys conducted in the Morrison Run project area found that stream habitat is lacking large wood and in-stream cover. Since large wood is important for creating larger, deeper pools, the low numbers of large wood is likely contributing to the low numbers of quality pools observed. Large wood in streams is also important for connecting aquatic habitats, promoting stream stability, and sediment and organic matter storage (Dolloff and Webster 2000).
- 10) **There is a need to implement non-native invasive plant (NNIP) treatments that would limit the introduction and/or spread of NNIP and conserve forest resources in a manner that presents the least hazard to humans and maintains or restores forest resources (USDA-FS 2007a, pp. 13, 18, and 35 – referred to as NNIS).** NNIP are established within the project area and there is a need to implement activities that will remove and/or contain the further spread of these species and restore impacted forest resources.

- 11) **There is a need to maintain or enhance the quality of scenic resources including viewsheds, vistas, overlooks, and special features (USDA-FS 2007a, pp. 9, 10, 13, and 19).** Scenic vistas along State Route 321 South can be improved by removing vegetation that obscures the view.

Proposed Action

An Interdisciplinary Team examined the existing condition within the project area to develop site-specific proposals for natural resource management activities that help achieve the desired conditions described in the Forest Plan. To meet the Purpose and Need for this project, as described above, the Forest Service developed treatments the Proposed Action summarized in Table 1 (refer to Maps 2, 3, & 4, and Appendix A for the stand-level details). This project does not propose, approve or regulate private oil and gas development.

Table 1 summarizes the Proposed Action (Alternative 2) and notes the minor changes made to the proposal since the scoping period.

Table 1: Activities proposed for the Morrison Run Project (Alternative 2).

Proposed Activities	Total units
<i>Non-Native Invasive Plant (NNIP) Treatment</i>	
Manual, mechanical or chemical treatment	442 acres
<i>Recreation</i>	
Scenic vista clearing	10 miles
<i>Riparian and Aquatic Habitat Improvement</i>	
Addition of large wood to streams	4.1 miles
<i>Transportation</i>	
- <i>Roads</i>	
New construction	0.7 miles
Reconstruction, add to National Forest System	10.2 miles
Decommission	1.0 miles
- <i>Stone Pits</i>	
Expand existing pits	6 pits (2 acres each)
Rehabilitate existing pits	3 pits (3 acres each)
<i>Vegetation Management</i>	
- <i>Regeneration Harvests</i>	
Shelterwood seed cut/shelterwood removal cut	1,280 acres
Shelterwood removal cut	47 acres
Two-age final harvest	8 acres
- <i>Intermediate Harvests</i>	
Commercial thinning	64 acres
- <i>Timber Stand Improvements</i>	

Non-commercial white pine release	43 acres
Aspen clearcut	4 acres
Non-commercial eastern hemlock release	14 acres
Non-commercial release	327 acres
Reforestation	45 acres
<i>- Activities to Enhance Late Structural Habitat Conditions</i>	
Accelerate mature forest conditions	111 acres
Oak release	38 acres
<i>- Cultural Treatments</i>	
Site preparation ¹	1,397 acres
Herbicide ²	1,402 acres
Release	1,770 acres
Fence	415 acres
Fertilize	649 acres
Plant	451 acres
Prescribed burn	366 acres
Mechanical scarification	60 acres
<i>Wildlife Habitat Improvements</i>	
Herbicide application in wildlife openings ³	23 acres
Construct vernal pools ⁴	8 pools
Prescribed burn for warm season grasses	4 acres
Create basking areas	2 clearings

¹ Includes acres not associated with overstory treatments.

² Herbicide acres are a maximum and likely to be reduced based on ground conditions.

³ Increased from 18 acres in scoping proposal due to site assessment

⁴ Decreased from 10 pools in scoping proposal due to site assessment

Alternative 2 would provide an estimated 4.92 million board feet (MMBF) of saw timber during the 1st entry and 5.08 MMBF for the 2nd entry, and pulpwood fiber estimated at 3.11 MMBF for the 1st entry and 4.24 MMBF for the 2nd entry. The estimated combined total volume for the project would be 17.35 MMBF if the Alternative 2 were implemented.

Decision to Be Made

The Bradford District Ranger will make the following decisions:

1. What management activities to select, if any, to meet desired conditions as identified in the 2007 ANF Forest Plan,
2. What site-specific mitigations to select, if any, to minimize environmental effects of any selected management activities, and
3. Whether or not preparation of an Environmental Impact Statement is necessary.

Public Involvement

The proposed Morrison Run project was listed in the ANF Schedule of Proposed Actions (SOPA) beginning in fiscal year 2010 (04/01/2010 to 06/30/2010) on the ANF website.

On November 26, 2010 a Scoping package explaining the Purpose and Need for action, as well as the location and types of proposed activities, was mailed to 213 interested parties for comment. These included individuals and organizations who expressed interest in the project, adjacent landowners, subsurface mineral rights estate owners, public legislators (Federal, State and Township Supervisors), the Seneca Nation of Indians, the U.S. Fish and Wildlife Service, and the Pennsylvania Fish and Game Commission. The list of recipients and their affiliations can be found in the project file at the Bradford District Office (29 Forest Service Dr., Bradford, PA 16365). The Scoping package was also posted on the ANF website on November 24, 2010, and a news release and legal notice was issued to local newspapers and other media on December 1, 2010.

The public Scoping period for this project ended on December 31, 2010. Comments were received in writing via postal mail, electronically via e-mail, in person or over the phone from 94 individuals. The comments received from the public are available from the Bradford Ranger District office.

Scoping responses were reviewed by the Morrison Run Interdisciplinary Team and were used to identify potential issues, determine if additional alternatives were needed and guide the analysis. Appendix B summarizes the comments and issue analysis. Chapter 2 explains the process for issue identification and the development of alternatives for further analysis.

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CHAPTER 2: ISSUES AND ALTERNATIVES

This chapter describes the issue analysis process and compares the Alternatives considered for the Morrison Run Project.

Issues and Alternative Development

The Scoping process allows interested parties to comment on a proposed action. These public comments are then analyzed and categorized as non-issues or issues. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, directing agencies to "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review." Issues received from the public are used to guide analysis and formulate alternatives to the Proposed Action.

Comments identified as non-issues included the following categories:

1. Requests for more information or suggestions for the environmental analysis
2. General concerns or opinions that were not related to the Proposed Action's effects, and, therefore, cannot be resolved through consideration of an alternative or mitigation
3. Comments regarding effects of the proposed activities that are (a) beyond the scope of the Proposed Action; (b) irrelevant to the decision to be made; (c) already decided by law, regulation, or policy; or (d) conjectural in nature or not supported by scientific evidence.

Comments identified as issues were those that described relevant and site-specific conflicts regarding potential environmental effects of the proposed action that could be addressed in an alternative. All comments were evaluated in the context of the proposed activities and the specific geography and resources of the Morrison Run project area and, so identification of issues from similar comments may differ among projects.

The public comments received during the scoping period and the issue analysis are summarized in Appendix B. There were two issues identified through the Scoping process: 1) there was a concern that proposed timber management activities would negatively affect the recreation experience on the Morrison Run trail and the North Country National Scenic Trail; 2) there was a concern that the proposed new road construction would exacerbate forest fragmentation. Additionally, the Interdisciplinary Team suggested that the proposal to create temporary openings exceeding 40 acres required further analysis. The Responsible Official determined that detailed analysis of an additional alternative that addressed these issues was warranted.

Alternatives Considered But Eliminated

There were no Alternatives proposed during the Morrison Run scoping process that were considered but eliminated for this project. Several scoping comments suggested that the ANF adopt a management strategy different from that in the Forest Plan and made recommendations based on that strategy. However, such programmatic decisions are beyond the scope of the Morrison Run Project and therefore did not merit further consideration as project-level alternatives (see Appendix B for rationale). The issues identified through public scoping and internal discussions were incorporated into Alternative 3 below.

Alternatives Analyzed In Detail

Alternative 1 (No Action)

Under the No Action Alternative, no activities proposed for the Morrison Run Project would be implemented (Refer to Map 1 and Table 1). Selection of this alternative would not affect implementation of previously approved activities in the project area.

Alternative 2 (Proposed Action)

Alternative 2 would be implemented to accomplish the purpose and need identified for this project. Alternative 2 is provided in Table 1 of this EA (Refer to Maps 2, 3, and 4). Proposed treatments are listed by compartment and stand in Appendix A.

Alternative 3

Alternative 3 was developed to address issues identified during project scoping and through internal deliberation. This alternative would be implemented to accomplish the purpose and need identified for this project, though management would be less intensive than that proposed in Alternative 2. The activities proposed in Alternative 3 are listed by compartment and stand in Appendix A. Tables 2 and 3 describe the differences between Alternative 3 and Alternative 2.

Table 2. Issues and changes made to Alternative 2 to develop Alternative 3.

Issue: Temporary openings exceeding 40 acres			
Change to address issue: Modify or eliminate vegetation treatments that would create temporary openings exceeding 40 acres			
Compartment	Combined stands exceeding 40 acres	Alternative 2 acres	Alternative 3 acres
452	12 ² , 50 ¹	43	40
452	19 ¹ , 27	46	35
452	21, 31 ¹ , 40	53	37
454	65 ² , 66 ²	53	39
455	22 ² , 24 ¹ , 46, 71	53	38
455	23 ² , 28 ¹	77	35

Table 2. Issues and changes made to Alternative 2 to develop Alternative 3.

455	9, 45 ¹ , 48	97	37, 39
Issue: Effects of vegetation treatment along trails			
Change to address issue: Remove stand treatments proposed on the North Country National Scenic Trail and Morrison Run Trail.			
Compartment	Stand	Alternative 2 acres	Alternative 3 acres
449	004	40	0
449	007	37	0
454	022	40	0
Issue: New road construction contributing to fragmentation			
Change to address issue: Eliminate proposed new road construction and associated activities.			
Forest Road	Alternative 2 miles	Alternative 3 miles	Associated compartment/stand dropped in Alternative 3
FR656	0.15	0	455/008 (17 acres)
FR658	0.55	0	455/015 (23 acres)

¹ Stand removed from treatment in Alternative 3.

² Stand acreage reduced in Alternative 3.

Table 3: Comparison of proposed activities in Alternatives 2 and 3. All activities not listed in this table are unchanged from Alternative 2 (see Table 1 above).

Proposed Activities	Alternative 2	Alternative 3
<i>- Roads</i>		
New construction	0.7 miles	0.0 miles
Reconstruction, add to National Forest System	10.2 miles	8.0 miles
<i>Vegetation Management</i>		
<i>- Regeneration Harvests</i>		
Shelterwood seed cut/shelterwood removal cut	1,280 acres	1,001 acres
<i>- Cultural Treatments</i>		
Site preparation ¹	1,397 acres	1,117 acres
Herbicide ²	1,402 acres	1,122 acres
Release	1,770 acres	1,490 acres
Fence	415 acres	252 acres
Fertilize	649 acres	568 acres
Plant	451 acres	349 acres
Prescribed burn	366 acres	329 acres

¹ Includes acres not associated with overstory treatments.

² Herbicide acres are a maximum and likely to be reduced based on ground conditions.

Alternative 3 would provide an estimated 4.07 million board feet (MMBF) of saw timber during the 1st entry and 4.05 MMBF for the 2nd entry, and pulpwood fiber estimated at 2.60 MMBF for the 1st entry and 3.39 MMBF for the 2nd entry. The estimated combined total volume for the project would be 14.11 MMBF if the Alternative 3 were implemented.

Mitigation Measures for Alternatives 2 and 3

Mitigation measures go beyond the Standards and Guidelines listed in the Forest Plan and are designed to minimize, reduce, or eliminate some of the potential resource effects that the proposed activities may cause. The following mitigation measures would apply to Alternatives 2 and 3:

1. Prescribed burning would be carried out in the early spring or late fall, outside the peak recreation season. Nearby hiking trails and dispersed campsites would be checked, and hikers and campers would be warned prior to the prescribed burn. In addition, signs placed along roads and trails would warn individuals of the impending prescribed burn. Smoke management efforts would be implemented to prevent smoke from interfering with individuals within the affected area and potentially affected travel ways. Treatment units in Table 4 have prescriptions that include burning (refer to Map 2).

Table 4: Stands with prescribed burning proposed.

Compartment and Stand	Compartment and Stand
442007	446024
442012	449007
442032	454001
442040	454009
443056	454013
446001	454024
446011	454057
446019	

2. To minimize potential impacts to possible Indiana bat roost trees located on sites proposed for burning, slash would be pulled away from potential snag and live trees with sloughing bark prior to burning. Removal of fuels around potential roost trees would reduce flame height and heat intensity around these trees.

3. Stands 442007, 442012, 442032, 446001, 446011, 446019, and 446024 are proposed for prescribed burns and will require mitigation to reduce potential effects to a nearby bald eagle nest. Smoke management will be considered in developing a burn plan and burning will be conducted when wind direction and burning conditions will minimize impacts to the nest. In addition, monitoring of the nest will occur during burns to record any impacts to the nest.

4. Before implementation, a botanist will review stands 454050 and 452021 to verify the Regional Forester Sensitive Species (RFSS) found during surveys, determine the area occupied by these plants and provide direction for implementation to avoid impacts.

5. A botanist or biological technician will survey access pathways and work locations where machinery may be used to place in-stream structures, specifically in riparian zones where vegetation adapted to wet conditions may be found. If sensitive plants or animals are found they will be protected or avoided.

6. Put reserve area around the rock/boulder complex in 446011 where a turkey vulture nest was located. Keep a 1,320 foot buffer around the nest during the implementation of vegetation treatments from March 1- August 31 (USDA-FS 2007a, p. 88; from red-shouldered hawk).

Monitoring for Alternatives 2 and 3

Alternatives 2 and 3 would require soil quality monitoring in a sample of treated stands following Forest Plan direction. Pre-harvest and post-harvest monitoring for soil quality indicators, would be carried out in accordance with current regional direction (USDA-FS 2005).

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CHAPTER 3: ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the physical, biological, social, and economic environments of the project area and describes the environmental effects of implementing each Alternative.

Project Area and Description of the Affected Environment

The project is located within portions of the Lower Reservoir, Lower Kinzua Creek and Chappel Fork subwatersheds. It includes numerous streams including Brothwell, Pigeon, Morrison, Hemlock, Coon, and Indian Runs, as well as North Fork Chappel Fork and Chappel Fork. A majority of the streams are classified as High-Quality Coldwater Fishery, and all are wild trout streams. Morrison Run is classified as a Remote Trout Stream. The project area drains into the Allegheny Reservoir.

Public use areas include the Morrison Trail, Morrison Campground, Pine Grove Campground, Kinzua Beach Recreation Area, Kinzua Wolf Run Marina, Dunkle Corners Boat Launch, Rimrock Overlook and Trail, and portions of the North Country National Scenic Trail.

The project area is predominantly mixed oak, transition oak hardwood, and mixed hardwood in MA 2.2 and northern hardwood, mixed hardwood and Allegheny hardwood forest in MA 3.0 (Table 5). The project area also contains a large conifer/mixed hardwood conifer component that is most prominent along streams.

Table 5. Distribution of forest types by Management Area.

Forest Types	MA 2.2	MA 3.0
Red Pine	0 acres	< 1 acres
White Pine	26 acres	0 acres
White Pine-Hemlock	6 acres	0 acres
Hemlock	0 acres	71 acres
Oak Types	4,833 acres	619 acres
Northern Hardwood	3,234 acres	1,572 acres
Allegheny Hardwood	1,332 acres	1,808 acres
Sugar Maple	84 acres	0 acres
Mixed Upland Hardwoods	842 acres	4,193 acres
Quaking Aspen	19 acres	14 acres

Stands within the project area are primarily even-aged second-growth forest, a result of timber harvesting carried out in the late 19th and early 20th century (Table 6). On Forest Service lands within the Morrison Run project area, there is a fairly uniform age structure with over 90% of the stands between 50 and 150 years old. Early structural forest has been declining for the last 20 years and currently exists on approximately 3% of the project area. The decline of early structural habitat and increased amounts of mid-structural habitat is

similar to trends that are occurring throughout Pennsylvania and across the Region (Trani et al. 2001). Further information about the vegetation conditions in the project area and effects of the alternatives are in the wildlife report and (project record).

Table 6. Age class distribution of forest stands in MA 2.2 and MA 3.0 in the Morrison Run project area

Age Class	Current Area (2011)
0-20 yrs (early structural forest)	504 acres (2.7%)
21-50 yrs (young forest)	764 acres (4.1%)
51-150 yrs (mature forest)	17,342 acres (93%)
151-300 yrs (late-structural forest)	4 acres (<1%)
>300 yrs (old growth forest)	0 acres
Total	18,654 acres

During the Forest Plan revision, the southwestern portion of the project area was identified as one of the largest roadless areas on the ANF. However, a detailed Wilderness Area Evaluation determined that the Morrison area was not appropriate for wilderness designation and therefore this area is managed according to direction for Management Areas 2.2 and 3.0 (FEIS Appendix C, p. C-25, C-30).

The project area has been influenced by many insect and disease outbreaks that have resulted in long-term forest health problems. In the eastern portion of the project area beech bark disease (BBD) has lead to widespread beech decline and decreased stand quality. BBD is an introduced disease complex currently causing substantial beech mortality on the ANF and in the eastern United States. The disease complex affects the largest beech trees first, which contain higher nitrogen content in the bark, but as the disease persists in affected stands, younger trees with lower bark nitrogen concentrations are also affected (Latty et al. 2003). This mortality results in a dense understory of susceptible root sprouts, referred to as beech brush, that can reduce or prevent establishment of tree seedlings. Additionally, this increase in the amount of susceptible beech stems in affected areas may potentially lead to a second beech bark disease outbreak of more serious impact than the first (Otrofsky and McCormack 1986). As a result, the health and productivity of the affected stands dramatically declines as the disease progresses.

The project area contains approximately 195 miles of road, including approximately 40 miles of classified National Forest System roads (also referred to as Forest Roads and abbreviated as FR), approximately 20 miles of State and Township (municipal) roads, and approximately 135 miles of roads related to OGD, private owners, or unknown jurisdiction of roads (i.e. non-system roads). Details are provided in the Morrison Run Transportation Report in the project record.

At the time of this analysis (spring 2011) there were approximately 1,189 privately owned oil or gas wells within the project area on NFS land. Wells within the project area have associated tank batteries, pipelines, additional equipment, power lines and roads. The majority of the existing wells are located within the northern and eastern portions of the project area in MA 3.0, but future development will likely extend into MA 2.2 in the western portion of the project area. Appendix D describes the existing condition and potential future conditions of oil and gas development in the project area.

On August 17, 2008 vandalism of six oil tank batteries resulted in approximately 45,570 gallons (1,085 barrels) of oil released into the environment. An estimated 17,220 gallons entered into streams from three of the tank batteries. Two of the locations where oil entered the stream were in the upper reach of the North Fork of Chappel Run (Lot 07 West and Lot 07 East) and one location was in the headwaters of Indian Run (Lot 02 West), a tributary to North Fork Chappel. Wildlife biologists from the Pennsylvania Game Commission (PGC) and the USDA Forest Service (FS) were charged with completing a damage assessment of wildlife populations and habitat from this oil spill focusing on mammals and birds but not excluding amphibians and reptiles. Pennsylvania Fish and Boat Commission (PFBC) biologists and USDA Forest Service fisheries biologists were charged with assessing fish populations and habitat and the Pennsylvania Department of Environmental Protection (DEP) agreed to assess macro-invertebrates. The impact was expected to be short-term and as of the time of this analysis (2011), streams within the cumulative effects area have not been listed as impaired by DEP.

Descriptions of the affected environment for each resource are presented in the analysis below. These descriptions provide a thorough assessment of the existing condition of the project area. The analysis of the no action alternative (Alternative 1) is equivalent to an assessment of the future conditions in the project area if the activities proposed in the Morrison Run project were not implemented. Additionally, a Forest-wide description of the affected environment by resource area is found in the 2007 ANF Forest Plan FEIS.

Analysis Framework

This analysis is tiered to the ANF Forest Plan (USDA-FS 2007a); Final Environmental Impact Statement (FEIS) (USDA-FS 2007b) and Record of Decision (ROD) (USDA-FS 2007c). Chapter 3 of the FEIS provides an analysis of the following resources on the ANF and is incorporated by reference into this EA (USDA-FS 2007b): Air; p. 59, Economics; pp. 399-443, Heritage; pp. 380-384, Human health and safety; pp. 419-443, Hydrology; pp. 22-51, OGD; pp. 3-7, Recreation; pp. 296-328, Scenery; pp. 370-380, Soils; pp. 7-21, Transportation; pp. 64-74, Vegetation; pp. 77-179, Habitat; pp. 194-204. In addition, the approved EAs and EISs listed in Chapter 1 of this EA provide information to support this analysis.

Supporting information on private OGD on the Forest is provided in the following white papers: *Programmatic Effects of Private Oil and Gas Activity on the Allegheny National Forest* (USDA-FS 2010a, unpublished) and *Site-Specific Oil and Gas Development on the Allegheny National Forest* (USDA-FS 2010b, unpublished).

Supporting resource analysis for air, soils, vegetation, wildlife and transportation are located in the project record. The Biological Assessment (BA) for Federally Listed Threatened and Endangered Species and the Biological Evaluation (BE) for Regional Forester Sensitive Species are provided in Appendix C.

Indicator Measures for Resource Analysis

To analyze and disclose the biological, physical, and social effects of the alternatives considered in detail for this project, the Interdisciplinary Team defined the following Indicator Measures (IM) for each resource area.

Table 7. Indicator measures for assessing the effects of the Alternatives.

Resource	Indicator Measure
A. Vegetation and Forest Health	IM-1: Effects of the alternatives on beech bark disease. IM-2: Effects of the alternatives on oak type forest.
B. Wildlife and Sensitive Plants	IM-3: Effects of the alternatives on forest habitat structure and land conversion. IM-4: Effects of the alternatives on habitat fragmentation. IM-5: Effects of the alternatives on wildlife and plants with management considerations in the Forest Plan.
C. Non-Native Invasive Plants	IM-6: Effects of the alternatives on causing and promoting the introduction or spread of NNIP species.
D. Soils	IM-7: Effects of the alternatives on long-term soil productivity.
E. Hydrology	IM-8: Effects of the alternatives on aquatic habitat conditions. IM-9: Effects of the alternatives on water quality. IM-10: Effects of the alternatives on water quantity.
F. Air quality	IM-11: Effects of proposed activities on the attainment of National Ambient Air Quality Standards
G. Human Health and Safety	IM-12: Effects of the alternatives on wildland fire/fire danger risk.
H. Recreation	IM-13: Effects of the alternatives on Recreation Opportunity Spectrum. IM-14: Effects of the alternatives on stand-level changes to recreation activities and use patterns.
I. Scenery	IM-15: Effects of alternatives on landscape character and Scenic Integrity Levels.
J. Heritage	IM-16: Effects of the alternatives on cultural resources.
K. Economics	IM-17: Effects of the alternatives on providing goods and services.

Cumulative Effects Analysis Area

Analysis of cumulative environmental effects requires evaluating the proposed activities in the context of past, present, and reasonably foreseeable future activities that may potentially

contribute to impacts on resources. The Interdisciplinary Team for the Morrison Run Project conducted a comprehensive assessment of past, present and reasonably foreseeable future activities that could affect the resources analyzed below.

1. *Past activities*: In order to understand the contribution of past activities to cumulative effects, this analysis relies on current environmental conditions as a proxy for the impacts of past activities. This is based on the existing conditions (p. 8-12, 22-24) that reflect the aggregate of all prior human actions and natural events that have affected the environment on the ANF and contribute to cumulative effects of the alternatives.
2. *Present activities*: Activities currently undergoing implementation on NFS lands of the ANF, as well as activities on private lands within the cumulative effects boundaries described below.
3. *Reasonably foreseeable future activities*: Activities on NFS lands of the ANF, as well as on private lands within the cumulative effects boundaries that would be implemented within the next 20 years. This includes previously approved Forest Service activities, private activities that occur on Forest Service land and activities on private land.

Activities associated with private oil and gas development are ongoing on the ANF. The cumulative effects analysis for each resource includes an assessment of the alternatives in the context of reasonably foreseeable future private oil and gas development. Development of 608 privately owned wells in the project area over next 20 years was considered as a reasonably foreseeable future activity for the analysis below. Additionally, it is possible deep shale gas operations (e.g., Marcellus or Utica) will be developed in the project area. The rate of development and location of such operations is difficult to predict, so the environmental effects of deep shale operations are discussed only very generally.

A detailed description of the project-level projections for reasonably foreseeable private oil and gas activities is in Appendix D. Effects analyses of private oil and gas development, including deep shale operations, are discussed in the Forest Plan FEIS, the *Programmatic Effects of Private Oil and Gas Activity on the Allegheny National Forest* (USDA-FS 2010a, unpublished) and the *Site-Specific Oil and Gas Development on the Allegheny National Forest* (USDA-FS 2010b, unpublished).

Tables 8-10 summarize recent past and reasonably foreseeable future activities that considered in the analysis. Temporal and spatial boundaries for cumulative effects analysis are defined for each resource (see Table 11 below), so the activities considered as reasonably foreseeable described in the analysis below may differ among resources.

Table 8. Recent vegetation management activities in the project area (2000 – 2010)

Activity	Compartment and Stand	Total Area
Commercial thin	457027	30 acres
Salvage cut	453017, 453025, 453026, 453036	26 acres
Shelterwood seed cut	441024, 441025, 441027, 441042, 442039, 443006, 457012	109 acres
Shelterwood removal cut	453005, 453010, 453037, 453039, 454044, 455036, 456007, 456023, 457009	181 acres
Clearcut	442015, 443053, 443054, 453043	54 acres
Tree release	446032, 447002, 447003, 451027, 456023	100 acres
Prescribed fire	441025, 441035, 446031, 447004	28 acres

Table 9. Previously approved activities within the Morrison Run project area that have not been implemented

Treatment	Compartment and Stand	Area	Analysis document
Delayed Removal Cut	441025	10 acres	Wolf Pigeon EA
Delayed Removal Cut	442039	19 acres	Wolf Pigeon EA
Delayed Removal Cut	443006	15 acres	Wolf Pigeon EA
Delayed Removal Cut	446031	10 acres	Prescribed Fire EA
Delayed Removal Cut	447004	18 acres	Prescribed Fire EA
Total		72 acres	

Table 10. Summary of present and reasonably foreseeable non-forest conditions in the Morrison Run project area under the three alternatives

Land use	Present Condition (2011)	Future Condition (2031)		
		Alternative 1	Alternative 2	Alternative 3
NFS lands (acres) ^a	1,422	1,422	1,456 ^b	1,453 ^b
Private lands (acres)	57	57	57	57
Oil and gas wells (acres)	357 ^c	1,147 ^d	1,147	1,147
Total (acres and percent)	1,836 (9.3%)	2,626 (13.3%)	2,660 (13.5%)	2,657 (13.5%)

^a Total includes existing openings (97, 98, and 99 stand codes), and areas delineated using NAIP2100 imagery of bare and non-forested lands; 196 miles of road x 4.24 acres of open land per mile within the Project Area.

^b Total includes existing openings, proposed stone pit expansion, vista clearing and proposed Forest Service road construction – new corridor.

^c Calculated from the estimated area for well pads of existing wells (0.3 acres) x 1,189=357; the total road miles/acres for private OGD roads was accounted for under NFS lands; well pads for deep shale gas operations could result in conversion of 5-10 acres to non-forest conditions

^d This includes existing and reasonably foreseeable future wells

Cumulative Effects Boundaries

Cumulative effects analysis requires assessing the time span and location in which the potential effects of the proposed activities are relevant and meaningful for the resources considered. Potential cumulative effects of the Alternatives are analyzed by resource below.

The spatial and temporal bounds of cumulative effects analysis can vary by resource area depending on the scope and intensity of effects from the proposed actions, structure of natural landforms (such as watersheds), connectedness to man-made landscape elements outside the project area (such as for transportation systems) and overlaps in space and time with other activities. Table 11 describes the spatial and temporal boundary used for assessing cumulative effects for each resource.

Table 11. Spatial and temporal cumulative effects boundary and rationale by resource.

Resource	Temporal Boundary	Spatial Boundary
A. Vegetation and Forest Health	<p>Time frame: 2012-2031</p> <p>Rationale: This will take into account the completion of harvesting activities and five years post-harvest when regeneration is expected to be established (3-20 years).</p>	<p>Boundary for beech bark disease analysis: MA 3.0 within project area.</p> <p>Rationale: MA 2.2 does not have a large beech component and there is a lack of inventory available to indicate status of stand composition and/or stand health on private lands.</p> <p>Boundary for oak habitat analysis: Oak type forests within the project area.</p> <p>Rationale: Inclusion of the entire project area would dilute the effects of proposed treatments on the oak type since this would include non-oak forest types. In addition, extending the boundary to the north or east would dilute the effects due to lack of data in private land to the east and lack of oak habitat to the north up to Sugar Run.</p>
B. Wildlife	Time frame: 2012-2031	Wildlife boundary: Based on the following

Table 11. Spatial and temporal cumulative effects boundary and rationale by resource.

Resource	Temporal Boundary	Spatial Boundary
and Sensitive Plants	<p>Rationale: The majority of harvesting activities will be completed prior to 2026. An additional 5 years are added to this in order to properly analyze and disclose any residual effects of these treatments as regeneration is established. This timeframe allows for completion of other proposed and remaining approved vegetation management activities and takes into account reasonably foreseeable future Forest Service and private activities (e.g. private oil and gas development, vegetation management on private lands, or residential development).</p>	<p>watershed units:</p> <ol style="list-style-type: none"> 1) All of Chappel Fork subwatershed. 2) Kinzua Cr. (lower) subwatershed clipped to the Allegheny Reservoir. 3) Reservoir (lower) subwatershed clipped to the Allegheny Reservoir on the north and west sides. <p>Rationale: Watersheds are biologically relevant boundaries. Across this cumulative effects boundary the vegetation cover types, forest structure and development from non-Forest Service (private) activities are similar and will allow assessment of the effects of the alternatives on wildlife resources.</p> <p>Sensitive plants boundary: Project Area.</p> <p>Rationale: This boundary encompasses the cumulative effects of management activities and private activities on sensitive plants. Expanding the boundary to private land would not be beneficial because information is not available and could dilute any effects to sensitive plants and their habitat.</p>
C. Non-Native Invasive Plants	<p>Time frame: 2012-2031</p> <p>Rationale: See Sensitive Plants above.</p>	<p>Boundary: Project Area.</p> <p>Rationale: Measuring the spread of NNIP beyond this boundary as it relates to the proposed activities is not desirable due to the confounding effects of other dispersal methods (i.e, wind, water, animals).</p>
D. Soils	<p>Time frame: 2012 to 2031</p> <p>Rationale: This time period is appropriate for analyzing the incremental impact of the proposed activities in the context of previously approved activities and</p>	<p>Boundary: Project Area.</p> <p>Rationale: The direct and indirect effects would be limited to the site of the proposed activities, and analysis within the Project Area boundary would allow consideration of present and reasonably foreseeable future activities that could affect soil productivity in</p>

Table 11. Spatial and temporal cumulative effects boundary and rationale by resource.

Resource	Temporal Boundary	Spatial Boundary
	present and reasonably foreseeable future activities.	the area. The effects of the proposed activities or no-action would not be measurable beyond this boundary.
E. Hydrology	<p>Time frame: 2012-2031</p> <p>Rationale: The potential effects of basal area reduction are diminished beyond 5 years after the last removal cut is completed (see Wildlife and Sensitive Plants).</p>	<p>Boundary: See wildlife boundary</p> <p>Rationale: Activities with the potential to affect water quality and stream flows occur throughout the subwatersheds. To properly assess water quality and water quantity of streams flowing into the reservoir, FS and non-FS activities (includes private land and OGD) need to be considered in each subwatershed upslope of the reservoir.</p>
F. Air quality	<p>Time frame: 2012-2020</p> <p>Rationale: The time period provides an overall view of the incremental impact of proposed activities and private OGD activities in combination with past, present, and reasonably foreseeable future activities. Activities contributing to emissions beyond 2020 are too uncertain to be rigorously analyzed</p>	<p>Boundary: Emissions were estimated for the project area, the entire ANF and the 4-county area. Attainment of NAAQS was evaluated at the regional level.</p> <p>Rationale: The closest air quality monitors are in Erie and Pittsburgh and estimated for future emissions are modeled at the county scale.</p>
G. Human Health and Safety	<p>Time frame: 2012 to 2031.</p> <p>Rationale: The time period is appropriate for analyzing the incremental impact of the proposed vegetative and prescribed fire treatments in the context of previously approved activities and present and reasonably foreseeable future activities that could affect spread of</p>	<p>Boundary: Boundary defined by transportation routes and ANF land (northeast boundary is State Route (SR) 321 within the township of Corydon; southern boundary follows a segment of State Route (SR) 321 within the township of Hamilton; western boundary is the Allegheny Reservoir; and eastern boundary includes sections of National Forest Boundary).</p> <p>Rationale: All areas within the boundary are susceptible to wildfires and this boundary</p>

Table 11. Spatial and temporal cumulative effects boundary and rationale by resource.

Resource	Temporal Boundary	Spatial Boundary
	wildfires.	encompasses the communities and public roads that could be affected by prescribed fire. The boundary includes previously approved activities and reasonably foreseeable future activities (including private activities) that could affect spread of wildfires, along with the proposed activities.
H. Recreation	<p>Time frame: 2012-2031</p> <p>Rationale: The time period provides an overall view of the incremental impact of proposed activities and private OGD activities in combination with past, present and reasonably foreseeable future activities.</p>	<p>Boundary: Boundary defined by transportation routes and ANF land (northeast boundary is State Route (SR) 321 within the township of Corydon; southern boundary follows a segment of State Route (SR) 321 within the township of Hamilton; western boundary is the Allegheny Reservoir; and eastern boundary includes sections of National Forest Boundary).</p> <p>Rationale: This boundary encompasses all proposed actions. Recreation opportunities and activities are limited by the Allegheny Reservoir to the west, State Route 321 to the north, and private land to the east and southeast. The Upper Kinzua EA covered activities on FS land to the south. This boundary allows for the assessment of potential incremental impacts of proposed activities and private OGD activities in combination with past, present and reasonably foreseeable future activities to ROS (Roaded Natural) and existing recreation activities and their use patterns.</p>

Table 11. Spatial and temporal cumulative effects boundary and rationale by resource.

Resource	Temporal Boundary	Spatial Boundary
I. Scenery	<p>Time frame: 2012-2031</p> <p>Rationale: See Recreation.</p>	<p>Boundary: See Recreation boundary</p> <p>Rationale: The boundary for addressing cumulative effects on scenery is determined by the intersection of the major transportation corridors that correspond with Concern Level 1 & 2 travelways and the visibility of actions or effects on areas of public concern such as along the NCT.</p>
J. Heritage	<p>Time frame: 2012-2031</p> <p>Rationale: The majority of harvesting activities will be completed prior to 2026. An additional 5 years are added to this in order to properly analyze and disclose any residual effects of these treatments.</p>	<p>Boundary: Area of Potential Effect (APE) around proposed activities, defined by imposing 0.25 mi (400 m) buffer on specific areas proposed for treatment and corridors proposed for access, as well as existing and future projected private OGD.</p> <p>Rationale: Direct effects to heritage resources will be avoided; the APE accounts for indirect and cumulative effects of the proposed activities.</p>
K. Economics	<p>Time frame: 2012-2026</p> <p>Rationale: This time frame encompasses the first and second entries into stands proposed for commercial timber harvest.</p>	<p>Boundary: Elk, McKean, Warren and Forest Counties.</p> <p>Rationale: Most economic benefits from goods and services provided by the proposed activities would be in the four counties around the ANF.</p>

A: Vegetation and Forest Health

Analysis Framework

This section describes current status of beech bark disease and oak forest health in the Morrison Run project area and identifies differences among the alternatives on future conditions. The context for the proposed vegetation management activities is described above and, more generally, in the Forest Plan and FEIS. Assessing the current condition of the project area required both GIS-based analysis and extensive field surveys of the areas where vegetation management activities are proposed. The project-level vegetation conditions are described above in the summary of the affected environment, below in the discussion of

forest structure and conversion with respect to wildlife habitat and in the wildlife report (project record). More detailed descriptions the proposed vegetation treatments are in the Forest Plan Appendix A.

Environmental Consequences

IM-1: Effects of the alternatives on beech bark disease.

The uniformity of the second growth forest across the ANF increases vulnerability to damage from repeated natural stresses and exotic insects or diseases (USDA-FS 2007b, p. 3-93). Beech bark disease (BBD) is an insect-fungus complex (*Cryptococcus fagisuga*-*Nectria* spp. complex) which has resulted in substantial beech mortality in the eastern portion of the project area, with an understory response of increased beech root sprouts which are also susceptible to the disease (USDA-FS 2007b, p. 3-98). The dense regeneration of beech within the infested stands prevents the regeneration of other hardwood or conifer trees (Forrester et al. 2003; Hane 2003; Latty et al. 2003). Forest stressors are a challenge across the ANF but maintaining several structural-age classes and community composition and diversity at the landscape level helps reduce the risk of insect and disease outbreaks and subsequent mortality (Nyland 1996).

Direct and indirect effects

Changes in vegetation under Alternative 1 would generally result from natural stand development processes. Forest types that contain American beech would continue to decrease in stocking as beech bark disease continues to cause mortality. Some of these areas may convert to upland hardwoods as red maple, birch, and black cherry fill in gaps. However, stands with a large beech component would convert to smaller diameter beech-dominated thickets. Changes currently taking place due to disease and age would continue though the rate of change would vary depending on the interaction of natural forces such as additional drought, insect defoliations, or windstorms, and the stress of individual trees as well as human-caused forces (spread of invasive pests or diseases).

Most of the stands proposed for shelterwood seed cuts have been impacted by beech bark disease, with severe mortality in approximately 20% of stands. Proposed shelterwood seed cuts aim to improve site utilization, seedling presence, and species richness in high mortality stands by evening out light levels at a desired density. Those stands proposed for shelterwood sequences that exceed 40 acres under Alternative 2 are in areas that have been hardest hit by BBD. If Alternative 3 is implemented, 279 acres of stands impacted by beech bark disease will not be treated and reforested. Current densities within affected stands are highly variable, dependent upon the amount and spatial distribution of beech prior to the killing front's arrival. Large sections of many stands and some entire stands have transformed into "aftermath" forests, dominated by a new cohort of dense beech saplings that will eventually succumb to the disease (USDA-FS 2007b, p. 3-97). These beech saplings are preventing other tree species from becoming established. The presence

of vigorous, healthy seed trees varies between stands and project design would retain potentially resistant beech during implementation (USDA-FS 2007a, p. 94). Portions of stands that are already at or below seed cut residual densities would have few or no trees removed in the overstory while a series of cultural treatments such as site preparation and/or herbicide would occur in the understory to promote desirable seedling establishment. Additionally, areas lacking any seed source may require planting of desirable tree species to return the stand to full productivity.

Even-aged treatments on 1,339 acres under Alternative 2 and 1,060 acres under Alternative 3 enhance both the horizontal and vertical diversity in the project area through harvesting, reforestation, and wildlife habitat improvement activities. Harvested stands would have improved vigor and be more resilient to disturbance. The treatments proposed under both alternatives feature shade-intolerant and mid-tolerant species such as red oak, yellow poplar, white ash, black cherry, and red maple. These species thrive in full sunlight conditions and maintain the hardwood communities presently found in the project area.

Herbicide treatments are proposed in combination with even-aged regeneration harvests to reduce competing vegetation (fern, grass, striped maple, and beech), which often prevents tree seedlings from becoming established in the understory. Herbicide application would help restore understory diversity and abundance. A wider range of plant communities could be expected to occupy the understory following treatment with herbicide. This could include tree species as well as shrubs, forbs, and wildflowers, which are not currently present. Those species that are targeted by the herbicide would be reduced in abundance but would persist in smaller numbers within the stand and in areas where herbicide would not be applied. The effect of herbicide is temporary, creating a window of opportunity for other species to become established and many of those species initially reduced in abundance would quickly repopulate the treated areas.

Cumulative effects

The cumulative effects boundary is limited to MA 3.0 in the project area therefore the results are the same as those described under direct and indirect effects of the alternatives. There is a lack of inventory available to indicate the states of stand composition and health of forested stands on private lands within the project area. Regardless of the alternative selected, there are changes anticipated due to private OGD throughout MA 3.0. Private OGD is anticipated to convert 790 acres from vegetated to un-vegetated land. Some of this predicted development overlaps with areas impacted by BBD and proposed for treatments on greater than 40 acres. The effects of this development are difficult to predict, but it is unlikely that the stands affected by BBD would improve without active management such as the proposed treatments in Alternatives 2 and 3. Under Alternative 2 (and Alternative 3, to a slightly lesser extent), the creation of openings exceeding 40 acres could temporarily increase the percent of open land in the project area when considered with the longer-term conversion of land

from private OGD. However, these openings would be reforested would contribute to a greater diversity of age classes and healthier stands in the long term.

IM-2: Effects of the alternatives on oak type forest.

There are 5,452 acres of oak type forest within the project area. The majority of the oak habitat (4,833 acres, or 89% of the habitat type) is located in MA 2.2, with only 618 acres of oak forest in MA 3.0. The Forest Plan identified oak management as a priority (USDA-FS 2007a, pp. 19, A-13 to A-16), and the large area of oak forests in the Morrison Run Project provides the opportunity to actively manage the oak forest resource to ensure its continued presence on the ANF landscape. Red maple is currently the most abundant seedling species in oak types on the ANF (Morin et al. 2006). This sets the stage for a transition to red maple or upland hardwood forest types if efforts are not made to promote oak seedling development to sustain oak forest resources in the future.

Prescribed fire increases the competitive advantage of oak over interfering species such as birch, striped maple and red maple. Set in spring or autumn these burns are low to moderate intensity fires that top kill competing mesic species without harming dominant oaks. Prescribed fire has been found to increase available light up to 3% after one burn and up to 10% following repeated burns (Alexander et al. 2006). The canopy covers within these mature stands are anticipated to be reduced to approximately 72% following an initial burn and perhaps as low as 65% following repeated burns (in combination with overstory treatments). The minimum amount of light required for oak to survive in the understory is two to five percent of full sunlight and typically, positive shoot growth of oak can be expected above 20 percent of full sunlight (Gottschalk 1987). Although light levels would be significantly less than those that maximize oak seedling growth (40 percent of full sunlight), seedlings would be within range to allow the establishment and more limited growth of oak seedlings. These lower light levels would also reduce response of unwanted competing vegetation. These treatments coincide at a time when deer densities are at historically low levels. Reduced deer browse may allow oak seedlings to persist longer in the understory thus allowing root systems to slowly expand over time. In contrast to burning in stands proposed for regeneration treatments, prescribed burning within mature mixed oak stands would focus less on the regeneration of woody seedlings and more on the creation of greater plant diversity in the understory.

Direct and indirect effects

Under Alternative 1, without further management, many oak stands in the project area would likely convert to upland hardwood stands dominated by red maple and birch. Some of the important oak species in the project area have been shown to decrease in acorn production as tree diameter increases (Downs and McQuilkin 1944). Existing interfering vegetation would continue to persist and simultaneously create poor seed germination conditions or prevent seedlings from becoming established. Conversely, the proposed action alternatives contain oak treatments including 111 acres of treatments that accelerate mature forest condition (AMFC), 37 acres of shelterwood seed cut and

shelterwood removal cut, 38 acres of oak release and 14 acres of non-commercial oak release along with prescribed fire on 366 acres and 329 acres under Alternatives 2 and 3 respectively will help to improve and retain the oak forest type within the project area.

Under Alternative 2, 3.7% (200 acres) of the oak component will be managed with overstory treatments and 6.7% (366 acres) will be managed with prescribed burns. Under Alternative 3, 3% (163 acres) of the oak component will be managed with overstory treatments and 6% (329 acres) will be managed with prescribed burns. In the long-term, these proposals contribute to achieving Forest Plan goals with respect to plant diversity and oak ecosystems including: 1) reintroduction of fire into fire-adapted oak ecosystems to conserve regional biodiversity and sustain ecosystem structure and function, 2) the maintenance of a diversity of understory mast-producing species, and 3) the conservation and enhancement of native plant diversity, abundance, and distribution across the Allegheny (USDA-FS 2007a, pp. 14, 15).

Proposed activities include 111 acres of accelerating mature forest condition. This is a variable density thinning which is designed to promote development of mature forest conditions including larger trees and variable tree density. This treatment occurs in stands that are overly dense with smaller diameter trees and removal occurs in a non-uniform manner in order to mimic small natural disturbances. This treatment would reduce canopy density resulting in more rapid development of larger diameter trees with enlarge crowns as well as introduce more complex structure to the stand.

A shelterwood sequence will be implemented on 37 acres under Alternative 2 and zero acres under Alternative 3. A shelterwood seed cut is intended to further the recruitment of tree seedlings, increase the competitiveness of established oak seedlings to ensure successful regeneration and future stocking of various oak species in order to sustain these oak forest types. The shelterwood removal cut is the second entry which occurs three to 20 years after the shelterwood seed cut and is necessary to provide abundant sunlight to seedlings once they are established and competitive with other species (USDA-FS 2007a, p. A-14 to A-15).

Commercial and non-commercial oak releases are an intermediate treatment designed to reduce stocking around desirable individual oak trees in order to enhance growth, crown size, and vigor with the ultimate goal of enhancing mast production for wildlife. Release treatments are located within a large contiguous portion of oak dominated forest in Compartment 446 south of Kinzua Heights Road. The understories within these stands have limited seedling and/or plant diversity and, with the exception of patches of low bush blueberry, are dominated by fern. A distinct midstory of red maple dominates this treatment area with patches of intermixed sweet birch, striped maple, fern, grass, and mountain laurel are allowing trace amounts of light to reach the forest floor. Increases in available light would occur as a result of overstory treatments as well as from cultural treatments in the understory. It is anticipated that canopy cover would decrease from 90% to approximately 75% through the removal of overstory trees as a result of proposed oak crop tree thinnings.

Understory treatments such as herbicide, site preparation and prescribed fire would also occur in conjunction with the overstory treatments to restore understory species diversity and structure. Enhanced individual tree growth and greater vertical diversity will accelerate the development of late structural stand conditions. These proposed treatments would help move the portion of MA 2.2 within the project area toward MA specific desired conditions described in the Forest Plan (late structural emphasis, increased structural and species diversity) (USDA-FS 2007a, p. 109).

Cumulative effects

The cumulative effects boundary is limited to the oak component in the project area. There is no oak component on managed private lands but there are changes anticipated due to private OGD in MA 2.2 which is dominated by oak type forest. Private OGD is anticipated to convert approximately 790 acres to open land. Some of this alteration will include forested lands, including oak habitat. However, the particular location and effects of this development is difficult to predict.

B: Wildlife and Sensitive Plants

Analysis Framework

This section describes current habitat conditions in the Morrison Run project area, identifies differences in future habitat conditions among the alternatives and summarizes the determinations of effects for wildlife and sensitive plant species.

The analysis below focuses on the effects of the alternatives on habitat structure and forest fragmentation, which was one of the issues identified during project scoping. The indicators of habitat quality and diversity used to assess effects and compare alternatives are directly related to Forest Plan overall goals and objectives for wildlife and sensitive plant management (USDA-FS 2007a, p. 14-15, 20) as well as desired conditions and objectives specific to Management Areas 2.2 and 3.0 (USDA-FS 2007a, pp. 109, 113).

Effects determinations for Federally Threatened and Endangered species, Regional Forester Sensitive Species, Management Indicator Species, other species with viability concerns and game species are summarized after the habitat analysis. The life history, population trends, threats, management goals and Forest-wide habitat status of sensitive species are described in the Forest Plan and ROD (USDA-FS 2007a), the Forest Plan FEIS (USDA-FS 2007b), ANF Biological Evaluation (Forest BE; USDA-FS 2007c) and the analysis in the Fish and Wildlife Service Concurrence Letter (USDI-FWS 2007).

More detailed analysis of the potential effects to individual species can be found in the Morrison Run Biological Assessment (Appendix C1), Biological Evaluation (Appendix C2) and Wildlife Report (in the project record). The analyses in these documents thoroughly

assess the direct, indirect and cumulative effects to individual species that are expected to occur under each of the alternatives.

Environmental Consequences

IM-3: Effects of the alternatives on forest habitat structure and land conversion.

Forest structure

Direct and indirect effects

Changes in the vegetation structure under Alternative 1 would generally result from natural stand development processes. Ongoing processes such as growth, disease or decline would continue, likely resulting in reduced structural diversity and increased forest health problems, which could decrease habitat quality for wildlife. The most dramatic change in forest age would be the loss of most early structural habitat in the project area. Under Alternative 1, there would be no 0-20 year age class by 2026 in MA 2.2 and there would be less than 1 percent in MA 3.0. The majority of the project area, 96% (17,860 acres), would remain in mature forest conditions (51-150 year age class) and in each MA, would continue to account for greater than 90% of the structural condition. These changes would likely favor wildlife species that prefer mature forest and late structural conditions, but forest health problems in some older stands would likely increase in the future so that some of these areas would not be maintained as high quality wildlife habitat.

The anticipated changes in forest structure resulting from the three alternatives are shown in Tables 12 and 13. Note that these tables track the current stands into the future condition and account for vegetation management activities proposed in Alternatives 2 and 3 but do not incorporate conversion of forest to non-forest because it is difficult to predict where such changes would occur.

Table 12. Changes in habitat age class within Management Area 2.2

Age Class	Current Area (2011)	Future Area (2026)		
		Alt. 1	Alt. 2	Alt. 3
0-20 yrs (early structural forest)	67 0.06%	0	8 < 1%	8 < 1%
21-50 yrs (young forest)	28 0.03%	67 < 1%	67 < 1%	67 < 1%
51-150 yrs (mature forest)	10,281 99%	10,221 98.5%	10,214 98.4%	10,214 98.4%
151-300 yrs (late-structural forest)	0	88 < 1%	88 < 1%	88 < 1%
>300 yrs (old growth forest)	0	0	0	0
Total acres	10,376	10,376	10,376	10,376

Table 13. Changes in habitat age class within Management Area 3.0

Age Class	Current Area (2011)	Future Area (2026)		
		Alt. 1	Alt. 2	Alt. 3
0-20 yrs (early structural forest)	437 5.3%	45 < 1%	1,376 16.6%	1,097 13.3%
21-50 yrs (young forest)	736 8.9%	550 6.6%	495 6%	511 6.2%
51-150 yrs (mature forest)	7,061 85.3%	7,639 92.3%	6,364 77%	6,627 80%
151-300 yrs (late-structural forest)	43 < 1%	43 < 1%	43 < 1%	43 < 1%
>300 yrs (old growth forest)	0	0	0	0
Total acres	8,278	8,278	8,278	8,278

Timber harvesting and non-commercial vegetation management proposed under Alternatives 2 and 3 would shift the forest in the project area toward Forest Plan objectives for forest structure. Almost 85% of the Morrison Run project area would remain in mature forest conditions (51-150 year age class) under Alternative 2 or 3. However, in MA 3.0, the early structural class would increase to 16.6% under Alternative 2 and 13.3% under Alternative 3. This would primarily benefit game species and other wildlife that prefer early structural forest, but protection of specialized habitats, inclusions of conifers and other habitat elements within treatment stands would provide habitat for a wide variety of wildlife species. By contrast, in MA 2.2, approximately 98% of the habitat would be mature forest under either alternative and late structural conditions would increase to about 1% as some of the older stands of mature forest grow into the next age class (150 – 300 years). Maintaining the mature forest class in MA 2.2 would provide habitat for wildlife and sensitive plant species that prefer larger areas of older forest such as the northern goshawk. Alternative 2 would treat more areas currently in dramatic decline due to beech bark disease than Alternative 3, but both would address forest health conditions in mature stands that would otherwise transition into lower quality wildlife habitat.

Herbicide treatments are proposed in combination with even-aged regeneration harvests to reduce competing vegetation (fern, grass, striped maple, and beech), which often prevent desired tree seedlings from becoming established and limit the understory diversity and complexity. In addition, area fencing on 415 acres under Alternative 2 and 252 acres under Alternative 3 would provide an increase in species diversity and distribution, as it minimizes deer browsing of tree seedlings and wildflowers. These activities would help restore a wider range of plant communities in the understory resulting in increased diversity and abundance.

Cumulative effects

Table 14 shows the current and expected future forest structure in the cumulative effects area for wildlife. Regardless of the alternative selected for the Morrison Run project, previously approved and proposed Forest Service activities would create early structural forest habitat (0-20 year old) on 526 acres by 2031. On private lands (7,557 acres of the cumulative effects analysis area), it is assumed that timber harvesting would continue to occur at recent levels, which would result in an estimated 906 acres of forest in the 0-20 year age class (see Appendix C1 – Biological Assessment). Although private oil and gas development is expected in the cumulative effects area, this would primarily result in habitat fragmentation and conversion of forest to non-forest and it is therefore difficult to predict the effects of this activity on changes in the relative amount of forest structural classes.

Table 14. Changes in forest structure within the wildlife cumulative effects area.

Age Class	Current (2011)	Future (2031)		
		Alt. 1	Alt. 2	Alt. 3
0-20 yrs (early structural forest)	1,622 6%	1,432 5.2%	2,770 10%	2,492 9%
21-50 yrs (young forest)	2,659 9.6%	2,340 8.5%	2,285 8.3%	2,301 8.3%
51-150 yrs (mature forest)	23,359 84.4%	23,732 85.7%	22,449 81.1%	22,712 82%
151-300 yrs (late-structural forest)	43 0.02%	179 0.07%	179 0.07%	179 0.07%
>300 yrs (old growth forest)	0	0	0	0
Total acres	27,683	27,683	27,683	27,683

Under Alternative 1, mature forest conditions (stands 50-150 years old) would dominate the cumulative effects area by 2031 (98% of MA 2.2, 86% of MA 3.0 and 85.7% across the entire area including private land). Reasonably foreseeable future activities are expected to create early structural type habitat on 5.2% (1,432 acres) of the cumulative effects area. Following implementation of the reasonably foreseeable future shelterwood removal cuts on Forest Service lands, ~0.05% of MA 2.2 and 4.6% of MA 3.0 would have early structural habitat. Although there would be some early structural habitat within the analysis area due to previously approved, proposed and private activities, the acreage would be substantially less than the forest-wide objective of 8-10% of MA 3.0 in early structural habitat. Consequently, there would be less habitat for wildlife species that prefer such conditions. Additionally, habitat quality in forest types with a large component of American beech would continue to decline as beech bark disease reduces stocking and produces dense thickets of beech brush.

Alternatives 2 and 3 would have similar cumulative effects for forest structure. Both alternatives would create approximately twice as much early structural habitat in the cumulative effects analysis area as Alternative 1 (Table 14). This increase in available

early structural habitat, almost entirely in MA 3.0, would benefit species associated with early structural habitat such as the mourning warbler or the ruffed grouse. Alternative 2 would create approximately 300 acres of early structural habitat more than Alternative 3, primarily to address undesirable changes in forest conditions due to beech bark disease. Mature forest would be present on 81.1% and 82% of the cumulative effects area under Alternatives 2 and 3, respectively, and young forest, late structural forest, and old growth forest would also be similar under all three alternatives.

Conversion of forest to non-forest

Direct and indirect effects

Non-forest land-use conversions (new road building, pit expansion, and oil and gas development) result in a loss of vegetated habitat for wildlife. Most of the conversion of forest to non-forest on the ANF results from private oil and gas development and associated activities such as road construction. Some wildlife may use roads for travel corridors; in particular, bats and some raptors may fly along long road corridors. However, wildlife require vegetation to meet all other biological needs including nesting, foraging and cover, so roads and bare areas are considered unsuitable or low-quality wildlife habitat. Common negative effects of roads on wildlife include mortality from road construction, mortality from collisions with vehicles, modification of animal behavior, alteration of the physical environment, alteration of the chemical environment, spread of non-native invasive plants and increased use of areas by humans (Trombulak and Frissell 2000). Species that are associated with forested and forest interior habitats in particular, are negatively affected by road construction because it leads to habitat fragmentation and increased human disturbance.

Approximately 11 percent (2,106 acres) of the project area is considered non-forested habitat (pits, wells, Forest Service roads, private and municipal roads, and 57 acres of housing development on private lands). Alternative 1 would not result in conversion of any forested habitat to non-forest due to new Forest Service activities. Alternatives 2 and 3 propose 12 acres of pit expansion and Alternative 2 proposes 3 acres (0.7 miles) of new road construction. Either of these alternatives would constitute a negligible change in habitat availability across the project area. Additionally, 9 acres of the existing 30 acres of pit are proposed for rehabilitation in Alternatives 2 and 3, which makes the net effects of forest conversion even smaller. This activity would not occur under Alternative 1.

Cumulative effects

Currently, 12 percent (3,529 acres) of the cumulative effects area is considered non-forested. Reasonably foreseeable private OGD is likely to result in conversion of approximately 1,141 acres from vegetated habitat to nonforested by 2031. By 2031, it is estimated that there will be a total of 3,087 acres of wells, roads and pads associated with private oil and gas development on National Forest System lands within the cumulative effects analysis area for the Morrison Run project. This constitutes a 62% increase in

OGD from 2011 to 2031. Although the Forest Service activities proposed in Alternatives 2 and 3 would result in some conversion of forest to non-forest, this would result in less than 1% of the total conversion of forest to non-forest expected in the next 20 years.

IM-4: Effects of the alternatives on habitat fragmentation.

Forest Plan goals for wildlife and sensitive plant species include enhancing habitat quality for species with viability concerns that prefer interior or remote habitat with relatively little human disturbance (USDA-FS 2007a, p. 14). To evaluate this goal at the project level, this analysis compares the effects of the alternatives on habitat fragmentation in the Morrison Run project area. Evaluating habitat fragmentation is particularly relevant for this project because the southwestern part of the project area was among the largest roadless areas on the ANF.

To analyze habitat fragmentation, the project area was categorized into three habitat classes: maturing or mature forest (greater than 20 years of age; hereafter referred to as mature because most forest in this category is 50-150yr old), young forest (0 to 20 years of age) or open (vegetated or water body). Boundaries between habitat classes and roads were considered as edge features, and GIS was used to create 300ft buffers from the habitat edges to identify core patches of more remote habitat that were greater than 1 acre. This process was conducted for the current condition as well as for potential future conditions, including reasonably foreseeable private oil and gas development (from Appendix D).

The core habitat patches for each scenario were then analyzed with the Patch Analyst extension for ArcGIS (Rempel 2010). Variables used to compare the effects of the alternatives on habitat fragmentation included the total core area, the number of patches, and the size of the largest patches for each habitat class. Comparing these results among potential future conditions allows evaluations of the relative contribution of different activities to habitat fragmentation. For more information on the methods used for this analysis see the protocol and for Patch Analyst in the Morrison Run project record.

Direct and Indirect Effects

At the time of analysis, there were 66 patches of core habitat totaling 8,190 acres in the Morrison Run project area. The largest patch of core mature forest was 4,718 acres, the largest patch of core young forest was 6.5 acres and the largest patch of open habitat was 21 acres.

Under Alternative 1, there would be no additional habitat fragmentation from new Forest Service activities. The primary effect of no action would be 444 acres of young forest (0-20 years) within the project area growing into the mature forest class. This would slightly increase the size of some adjacent patches of mature forest and benefit species that prefer interior forest habitat. However, the lack of young forest core patches would negatively affect species that prefer early structural habitat. Overall, not implementing the proposed activities would reduce habitat diversity in the project area.

Alternative 2 would create 1,339 acres of young forest through regeneration harvests and aspen clearcuts and Alternative 3 would create 1,060 acres. Implementing these activities would create new edges between young and mature forest, which would slightly increase the number of habitat patches (85 for Alternative 2, 77 for Alternative 3) and slightly decrease the total core area (7,685 acres for Alternative 2, 7,850 acres for Alternative 3). Under either of these alternatives, the largest core patch of young forest would increase from 6.5 to 26 acres. The five largest core areas of mature forest would remain under both alternatives with minimal changes. The largest patch, in the southwestern part of the project area, would be reduced by 102 acres (~2%) under Alternative 2 and 63 acres (~1%) under Alternative 3 compared to Alternative 1. The third largest patch, (in the southern tip of the project area) would be approximately 34 acres (~7%) smaller under both Alternatives 2 and 3 than under Alternative 1; the other three core patches of mature forest larger than 300 acres would be unchanged regardless of alternative. This reduction in core area of mature forest could have minor and short-term negative effects on species that prefer remote and interior habitats. By contrast, both Alternatives 2 and 3 would more than double the amount of young forest in the project area and increase habitat diversity, which would substantially benefit wildlife species that utilize early structural habitat. The effects of the alternatives on core habitat within the Morrison Run project area are shown in Figure 1 below.

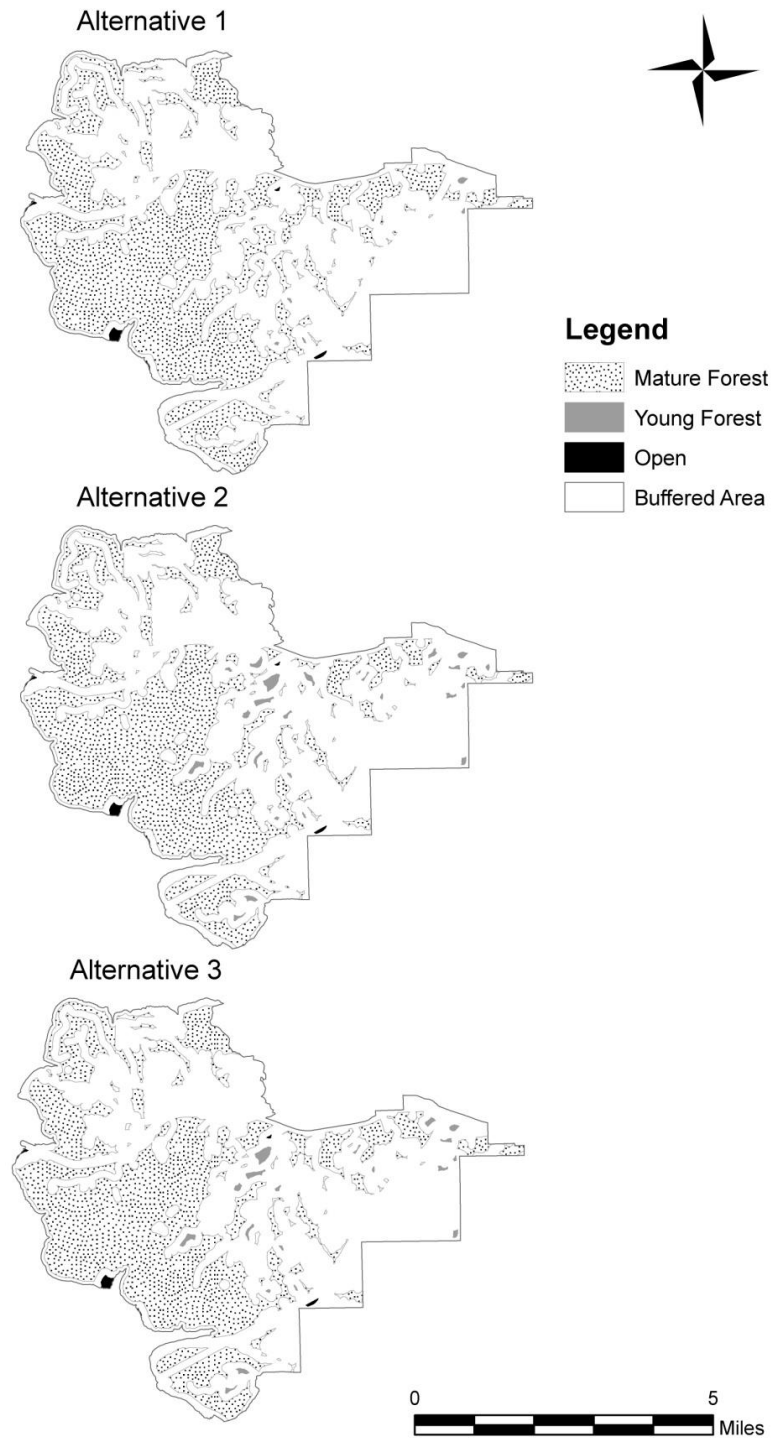


Figure 1. Results of fragmentation analysis of the Morrison Run project area.

Cumulative Effects

The direct and indirect effects of the alternatives described above would occur in the context of previously approved Forest Service actions and other reasonably foreseeable activities. Within the cumulative effects boundary for wildlife there are 526 total acres of regeneration harvests either previously approved or proposed by the Forest Service in other projects. Additionally, a detailed projection of potential future oil and gas development suggests that approximately 1,141 acres of land may be converted from forested to bare or open habitats (see Appendix D). The current condition of private lands within the cumulative effects area was estimated from aerial photographs; for this analysis it was assumed that the future condition would be similar to the existing condition and that OGD on private land would be proportional to OGD on Forest Service land. All of these activities would generate new edges and reduce the area of core mature forest habitat by dividing or encroaching upon current patches. Implementation of these reasonably foreseeable Forest Service and private activities would be independent of the decision made for the Morrison Run project so they are considered for all three alternatives.

At the time of analysis, there were 105 patches of core habitat totaling 9,377 acres within the cumulative effects boundary for wildlife. All of the largest patches of core habitat in the cumulative effects boundary were within the Morrison Run project area, though the patch at the southern tip of the project area increased in size from approximately 491 to 589 acres with the addition of land south of the project boundary. The largest patch of core mature forest was 4,718 acres, the largest patch of core young forest was 6.5 acres and the largest patch of open habitat was 21 acres.

Table 15 summarizes the effects of the alternatives on fragmentation variables and Figure 2 shows the results of the core habitat analysis for Alternatives 1, 2 and 3 at the end of the cumulative effects time frame (2031). The figures are very similar because most of the expected habitat fragmentation will be from private oil and gas development that is independent of the alternatives considered for the Morrison Run project.

Table 15. Summary of fragmentation in cumulative effects analysis area.

Variable	Future Condition		
	Alternative 1	Alternative 2	Alternative 3
Total core area (acres)	6,096	5,964	6,017
Number of patches	140	130	132
Largest mature forest patch (acres)	2,390	2,383	2,383
Largest young forest patch (acres)	4.4	4.4	4.4
Largest open patch (acres)	29	29	29

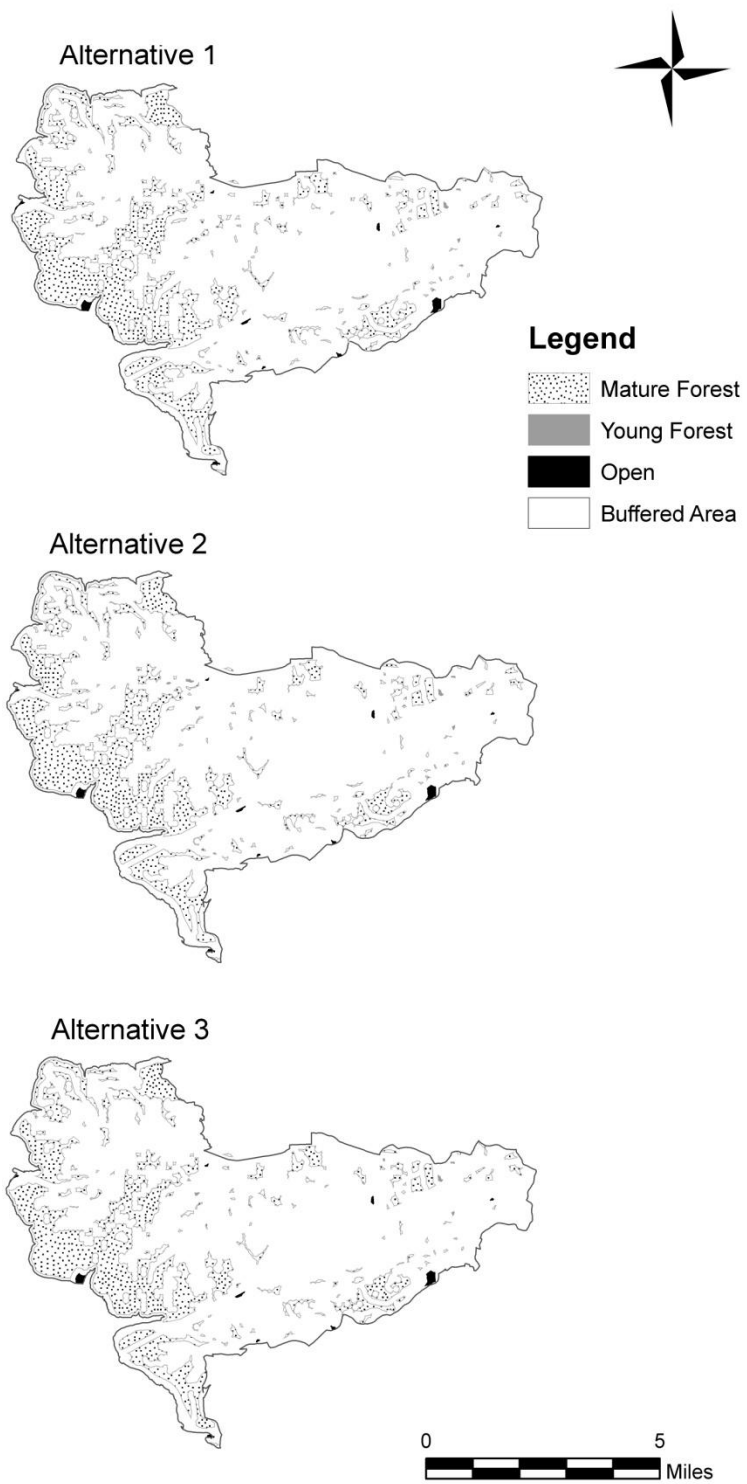


Figure 2. Results of fragmentation analysis in the wildlife cumulative effects area.

From the existing condition (2011) to the end of the cumulative effects analysis timeframe (2031), the total amount of core habitat is expected to decrease by over 3,000 acres under any of the alternatives considered for the Morrison Run project. Additionally, the largest patch of mature forest, in the southwestern part of the project area (currently 4,718 acres), would likely be divided into two smaller patches that together would be less than 2/3 the size of the current patch (compare Figures 1 and 2 to see this change). Although this level of habitat fragmentation would be compatible with continued existence of many species of wildlife and sensitive plants within the cumulative effects analysis area, the decrease in patch sizes could negatively affect species that prefer interior mature forest habitat with limited human interaction.

In summary, the cumulative effects analysis suggests that the area will experience additional habitat fragmentation in the reasonably foreseeable future, due mostly to private OGD. Because this development is independent of the proposed Forest Service activities, the differences among the alternatives in total core habitat area and largest patches of forest habitat are minimal (differences < 2.5%) compared to the effects of reasonably foreseeable private OGD on these variables (> 30% reduction in total core habitat and ~50% reduction in size of the largest patch of mature forest).

IM-5: Effects of the alternatives on wildlife and plants with management considerations in the Forest Plan.

Species with Viability Concerns

The Forest Plan identifies 78 species with viability concerns on the ANF. Five are listed as federally threatened or endangered, three are candidates for federal listing and 61 are Regional Forester Sensitive Species¹ (USDA-FS 2007b). Additionally, there are 11 Species of Concern identified in the FEIS that are not included in these designations (USDA-FS 2007b, p. 3-206 to 3-208). Threatened and endangered species and their habitats are analyzed in the Morrison Run Biological Assessment (Appendix C1), Regional Forester Sensitive Species are analyzed in the Biological Evaluation (Appendix C2) and Species of Concern are analyzed in the Wildlife Report (project file). The effects of the alternatives for the Morrison Run Project on all of these species are summarized below.

Federally Threatened, Endangered, and Candidate Species

Of the four endangered, one threatened, and three candidate species on the ANF, the five mussels have no suitable habitat in the project area and the Indiana bat, small-whorled pogonia, and northeastern bulrush have suitable habitat but there are no populations or

¹ Since the completion of the Forest BE (2007), the bald eagle was removed from the Endangered Species List (August 9, 2007) by the United States Fish and Wildlife Service (FWS) and it was then added to the ANF RFSS list at this time for a total of 61 species. Additionally, at the time of analysis the RFSS list was under revision; see Biological Evaluation (Appendix B2) for proposed changes.

individuals documented within the project area. A ‘no effect’ determination was made for all species under Alternative 1. A ‘no effect’ determination was made for the mussel species under Alternatives 2 and 3 because there is no suitable habitat in the project area. Additionally, a ‘no effect’ determination was made for the small-whorled pogonia and the eastern bulrush because they have not been recorded on the ANF despite the presence of suitable habitat. A ‘may affect not likely to adversely affect’ determination was made for the Indiana bat under Alternatives 2 and 3 because there have been Indiana bats identified on the forest and there is suitable habitat in the project area (see Appendix C1 – Morrison Run Biological Assessment).

Regional Forester Sensitive Species (RFSS)

At the time of analysis, the RFSS list was under revision. Therefore, the Biological Evaluation (Appendix C2) includes the species listed in the Forest Plan as well as those proposed for addition to the list. Of the 89 total species, 13 have occupied habitat in the Morrison Run project area, 52 have suitable habitat but species present is undocumented and 24 species have no suitable habitat in the project area. A ‘no impact’ determination was made for all 89 species under Alternative 1 and for the 24 species with no suitable habitat under Alternatives 2 and 3. A ‘may impact individuals but will not cause a trend toward federal listing or loss of viability’ determination was made for all 65 species with occupied or suitable habitat within the project area. With implementation of Forest Plan standards and guidelines, Pennsylvania BMPs, and project design features, no adverse long-term impacts are anticipated for any RFSS or their habitat due to the proposed activities (see Appendix C2 – Morrison Run Biological Evaluation).

Additional Species of Concern (SOC)

Eleven species are not on the RFSS list but are considered species with viability concerns on the ANF. The analysis of these species and their habitats indicates that there will be no adverse direct, indirect or cumulative effects to these species from the proposed activities (Morrison Run Wildlife Report, project file). Although all alternatives would result in slight increases or decreases in different habitat types within the project area, following Forest Plan standards and guidelines during implementation of the proposed activities would minimize impacts on individuals and protect suitable habitat for these species (USDA-FS 2007a, pp. 20 and 80-88).

Management Indicator Species (MIS)

Five MIS were identified in the Forest Plan to evaluate the effects of management on major categories of wildlife habitat. Table 16 lists these species, the habitats they represent and their status in the project area. For Forest-wide information, refer to pages 3-230 to 3-247 of the FEIS (USDA-FS 2007b). The northern goshawk, timber rattlesnake and several invertebrate species with aquatic life stages are also RFSS (see the Biological Evaluation Appendix C2).

Table 16. MIS habitat availability and status in the Morrison Run Project Area

Management Indicator Species	Represented Habitat	Documented in the Project Area	Suitable Habitat
Northern Goshawk	Mid-late structural mixed deciduous/conifer forest	Yes	Yes (17,385 acres)
Timber Rattlesnake	Remote deciduous forests with minimal human disturbance	Yes	Yes (6,999 acres)
Cerulean Warbler	Mid-late structural oak forest with some canopy gaps	Yes	Yes (5,452 acres)
Mourning Warbler	Early structural habitat	No	Yes (504 acres)
Aquatic Invertebrate Diversity and Relative Abundance	Aquatic habitat and water quality in ANF streams	Yes	Yes (64 mi of stream; 2,502 riparian and floodplain acres)

Northern Goshawk

Suitable habitat for the northern goshawk will increase under all three alternatives by 2026 compared to the current condition due to the maturation of young forests. Under Alternative 2 the increase in suitable northern goshawk habitat will be about 7% less than under Alternative 1 and under Alternative 3 it will be about 5% less. Proposed activities would not substantially modify the conifer component of the forest. There are considerable changes anticipated to occur to the forested area within the cumulative effects boundary due to private OGD. However, the activities proposed in this project have only incremental effects on core habitat (see analysis of habitat fragmentation above). Therefore, Alternatives 2 and 3 are not considered to substantially contribute to potential negative cumulative effects.

Timber Rattlesnake

Under the implementation of either Alternatives 2 or 3, the total remote area habitat would be reduced by about 9%, from 6,999 acres to 6,353 acres under Alternative 2 and 6,392 acres under Alternative 3. The loss of remote habitat under Alternatives 2 and 3 would result from conversion of mature forest to early structural habitat. Although this is not considered core area habitat because of the resulting edge effects between mature and early structural forest, these areas are still considered contiguous forests tracts and suitable habitat for timber rattlesnakes. Across the cumulative effects area, reasonably foreseeable private OGD is expected to reduce remote habitat by 32% (from 6,999 acres to 4,696) by 2031 regardless of the alternative selected for the Morrison Run Project. Implementing Alternatives 2 and 3 would further reduce core habitat by 33 acres due to timber harvests, but this effect would diminish as the forests regenerated. The three

alternatives differ only incrementally in their effects on remote habitat and none of them would substantially contribute to potential negative cumulative effects.

Aquatic Invertebrates

In Alternatives 2 and 3, the implementation of ANF Forest Plan standards and guidelines would protect aquatic invertebrates from activities such as timber harvesting and hauling, new road construction, and herbicide application which would otherwise have the potential to create sedimentation or directly alter water quality or riparian areas (USDA-FS 2007a, pp. 74-79). Effects on water quality and quantity are discussed in the hydrology analysis above. Although reasonably foreseeable private OGD could impact aquatic habitats, the activities proposed in Alternatives 2 and 3 of the Morrison Run Project would not result in negative effects to aquatic invertebrates and, therefore, these activities are not considered to contribute to an adverse cumulative effect.

Cerulean Warbler

There are a total of 5,452 acres of oak type forest within the project area, 89% of which (4,833 acres) is located in MA 2.2; only 618 acres of oak habitat are in MA 3.0. The cerulean warbler and other species associated with mid-late structural oak habitat with lower canopy closure would benefit from all oak treatments including accelerate mature forest condition (AMFC), oak release, prescribed burn and non-commercial oak release under Alternatives 2 and 3. Without further management (such as Alternative 1), oak stands in the project area would likely convert to upland hardwood stands dominated by red maple and birch.

Mourning Warbler

The mourning warbler is associated with early structural habitats, including regenerating forests 0-20 years old. Alternative 2 would create approximately 1,376 acres of early structural habitat and Alternative 3 would create approximately 1,097 acres. Across the cumulative effects area early structural habitat would be created regardless of the alternative selected since reasonably foreseeable future forest regeneration will occur on both Forest Service lands and adjacent private lands. However, a greater amount of early structural habitat will be available under Alternative 2 (17.6%) than Alternative 3 (15%), and the lowest amount would result under Alternative 1 (4.6%).

Game Species

Several game species are abundant in the project area and are expected to thrive under any of the alternatives. However, the activities proposed in Alternatives 2 and 3 would increase early structural habitat, improve oak habitats, regenerate aspen stands, thin oak and conifer stands and improve stream habitats. The increased habitat diversity and wildlife habitat improvements resulting from Alternatives 2 and 3 are anticipated to benefit species such as white-tailed deer, black bear, turkey, ruffed grouse, woodcock and brook trout more than the natural processes and lack of active management under Alternative 1. Monitoring by the PA Game commission indicates that increased hunting pressure on white tailed deer has brought the herd down by about 50% to 23.3 deer per

square mile in the eastern section of the project area (de Calesta, unpublished). This effort has brought the area closer to the desired Forest-wide level of 10 to 20 deer per square mile (USDA-FS 2007a, p. 20). More information on game species is available in the Wildlife Report located in the project record.

C: Non-native invasive plants

Analysis Framework

Surveys in the Morrison Run project area found 29 ANF NNIP species of concern infesting a total of approximately 72 acres within vegetation treatment stands, riparian areas, pits, openings, recreation areas and road corridors (Appendix A). Road corridors within this project area have the greatest amount of NNIP infestations (39 acres). Infestations of single or a small number of plants also occur within riparian corridors and forested areas. The current amount of NNIP infestations within areas surveyed was used to estimate the amount of NNIP infestation for areas not surveyed based on the percent of infestation by survey area type (for example, road corridor versus forested stands). Based on these estimates there are an additional 370 acres of NNIP treatment proposed for the project area over the next 10 – 15 years (See project file for additional information on NNIP estimates) for a total of 442 acres of NNIP proposed treatment utilizing a combination of manual/mechanical treatment (for example, hand pulling, clipping, digging) and/or herbicide (for example, backpack foliar, cut-stem) application of glyphosate and/or sulfometuron methyl. Method is determined by species, amount of infestation and site conditions at the time of treatment.

Herbicide use is permitted in all management areas to treat native and non-native invasive plant species (USDA-FS 2007a, p. 35). Herbicide treatment of NNIP within the project area would entail the use of backpack sprayers for spot-treatment of small, scattered locations (infestation areas typically less than 10 square feet). Only aquatic labeled glyphosate formulations would be used in areas near surface waters with appropriate buffers as prescribed in current ANF Forest Plan Standards and Guidelines (USDA-FS 2007a, pp. 54-59). These standards and guidelines are based on the Human Health Risk Assessment completed for the Forest Plan FEIS, Appendix G (USDA-FS 2007d). Appendix A of the Forest Plan (USDA-FS 2007a, pp. A43-A45) contains additional information on site selection, herbicide selection, and application methods and rates.

NNIP species documented within the project area include: Autumn olive (*Elaeagnus umbellata*), Black knapweed (*Centaurea nigra*), Brownray knapweed (*Centaurea jacea*), Bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), Coltsfoot (*Tussilago farfara*), Common mullein (*Verbascum thapsus*), Common periwinkle; myrtle (*Vinca minor*), Common reed (*Phragmites australis*), Crown Vetch (*Securigera varia*), Fuller's /common teasel (*Dipsacus fullonum*, formerly *D. sylvestris*), Garlic mustard (*Alliaria petiolata*), Glossy buckthorn (*Frangula alnus*), Japanese barberry (*Berberis thunbergii*), Japanese knotweed (*Fallopia japonica*, formerly *Polygonum cuspidatum*) and Giant knotweed (*Polygonum sachalinense*), Lesser burdock (*Arctium minus*), Moneywort; creeping jenny (*Lysimachia nummularia*), Morrow's honeysuckle (*Lonicera morrowii*), Multiflora rose (*Rosa multiflora*), Narrow-leaved cattail (*Typha angustifolia*), Orange daylily (*Heemerocallis fulva*), Orange

hawkweed (*Hieracium aurantiacum*), Purple loosestrife (*Lythrum salicaria*), Queen-anne's lace (*Daucus carota*), Reed canarygrass (*Phalaris arundinacea*), Spotted knapweed (*Centaurea stoebe ssp. micranthos*, formerly *C. maculosa*, *C. beibersteinii*), Tartarian honeysuckle (*Lonicera tatarica*), Tree of heaven (*Alianthus altissima*), and Wineberry; wine raspberry (*Rubus phoenicolasius*).

Ground disturbing activities that convert forested areas to non-forest, either grass/forb vegetation or areas with no vegetation (such as roads) are considered long-term effects of creating habitat conducive to shade intolerant NNIP species – which includes the majority of NNIP on the ANF (see project file for additional information on shade tolerance categories). The current condition of Forest Service land within the project area contains approximately 444 acres of 0-20 year age class (2.3%), 592 acres classified as open (3%), 830 acres of road corridor (4.3%), 57 acres of residential development on private land and 357 acres of oil and gas well sites, for a total of 1,836 acres (9.3%) of non-forested lands within the project area (Table 10).

Roadways are considered the primary corridors for NNIP spread via human activities (Gucinski et al. 2000). Haul roads and skid trails have been shown to be the primary conduit for the dispersal of introduced species into the interior of managed stands in upper Michigan and this study is considered to be applicable to the ANF (Buckley et al. 2003). However, the factors influencing the establishment and spread of NNIP vary by invasive plant species, habitat type disturbed, presence of a seed source, and dispersal vectors (Parendes and Jones 2000). To reduce the potential of proposed activities causing and promoting the spread of NNIP, the ANF would implement Forest Plan Standards and Guidelines for the prevention of NNIP, including contract clauses for equipment washing and actively establishing desired vegetation in areas of long-term ground disturbance.

Detecting, preventing and removing non-native invasive species were identified as agency duties by Executive Order 13112 (February 1999).

Environmental Consequences

IM-6: Effects of the alternatives on causing and promoting the introduction or spread of NNIP species.

Direct and Indirect Effects

Among the proposed activities in Table 1, vegetation management, vista clearing, transportation activities (new road construction and pit expansion/rehabilitation) were identified in the Forest Plan FEIS (USDA-FS 2007b, pp. 3-291 to 3-295) with the most likelihood of causing and promoting the introduction or spread of NNIP species. The general effects of management actions on NNIP are found within the ANF FEIS (USDA-FS 2007b, pp. 3-291 to 3-295) and are incorporated here by reference. In summary, management actions that cause ground disturbance and/or opening-up of the forest canopy have the greatest potential to facilitate the introduction and/or spread of NNIP on the ANF. Short-term effects are from changes in canopy cover, allowing more sunlight

to the forest floor which enhances habitat for shade intolerant NNIP species and creates more suitable growing conditions in which shade intolerant species may spread/grow. In areas of canopy disturbance, shade tolerant species take advantage of increased sunlight by increased growth and reproduction.

Under Alternative 1, existing NNIP species infestations would not be treated. Previously approved vegetation management on 73 acres would still occur of which 15 acres may receive herbicide treatments and as such if NNIP species are present in these areas they may be treated secondarily. The effects of the No Action Alternative on NNIP are that untreated NNIP infestations are anticipated to persist and/or spread. New proposed NNIP treatments and associated benefits for desired plant and animal communities would not be realized under this alternative as their habitat would continue to be degraded by NNIP.

Under Alternatives 2 and 3, vegetation management would create short-term conditions conducive to the spread of NNIP species through ground disturbance and reduction or removal of tree canopy. However, because of the temporary nature of these openings, this is expected to be a short-term effect. Generally, within 10-15 years after harvest, herbaceous and shrubby vegetation would be overtopped and less sunlight would reach the forest floor, thus reducing suitable growing conditions for shade intolerant NNIP species (with the exception of tree species such as tree of heaven). If all vegetation management was conducted under Alternative 2 at one time an additional 2,052 acres (10.7%) of the project area would be 0-20 years in age. However, as vegetation management is conducted in stages over the next 20 years with 1,254 acres (6.6%) being the highest estimated 0-20 age class in 2026 at any one time. If all vegetation management was conducted under Alternative 3 at one time an additional 1,773 acres (9.3%) of the project area would be 0-20 years in age. However, as vegetation management is conducted in stages over the next 20 years with 958 acres (5.0%) being the highest estimated 0-20 age class in 2026 at any one time.

Under both Alternative 2 and 3 ten acres of vista clearing is proposed. While this activity removes tree canopy (high shade), the establishment of permanent low-growing vegetation is desired in which NNIP species would be discouraged by establishing desired vegetation and NNIP would be treated should they become established.

NNIP species infestations were found along roadways adjacent to treatment stands and within treatment stands; therefore, it is possible that logging equipment used on these sites could facilitate the spread of NNIP species by carrying seeds or reproductive fragments into non-infested areas. In order to reduce this potential of the indirect introduction and spread off-site, an equipment cleaning provision is included in timber sale and other construction contracts.

Under Alternative 2 an additional 3 acres (0.7 miles) of new road construction and 21 acres of expand/rehabilitate would add up to an additional 24 acres of open-non-forested land in the project area. New road construction, road reconstruction, road decommissioning, and pit expansion/rehabilitation create non-forest conditions and

permanent edge habitat. These areas may become infested with NNIP species by natural agents such as wind and water, as well as by vehicles and other uses. These areas of disturbance will be seeded with a desired vegetation to help reduce growing space for NNIP, which will aid in reducing the potential for NNIP species establishment. Introduction of seeds or reproductive fragments from equipment to and from the pit area is also a concern.

Under both Alternative 2 and 3, approximately 442 acres of NNIP species would be treated to reduce or eliminate NNIP.

Cumulative Effects

Non-federal activities most likely to result in introduction and spread of NNIP species include short-term effects from vegetation management on private land and long-term effects from residential development and private OGD activities that convert forest to non-forest.

Within the cumulative effects analysis area privately owned land is comprised of 57 acres as opening/residential, 49 acres as 0-20 year age class and 501 acres as forested. It is estimated that an additional 75 acres of vegetation management will occur within private lands by 2031. Land conversion from residential development is not anticipated to occur within these private lands in the next 20 years based on past and current levels of residential development.

Future OGD on both private and NFS lands would have the greatest potential for ground disturbance and increased activity in both the short- and long-term within the Project Area. Current non-forest conditions of all lands within the project area is approximately 1,836 acres (9.3%). Reasonably foreseeable private oil and gas development is expected to convert approximately 790 acres to non-forest conditions in the next 20 years. Due to this activity, by 2031 non-forest area would increase to 2,626 acres (13.3%) under Alternative 1, 2,660 acres (13.5%) under Alternative 2 and 2,657 acres (13.5%) under Alternative 3.

D: Soils

Analysis Framework

The Forest Plan identifies maintenance, restoration or improvement of soil quality, productivity and function as forest management objectives (USDA-FS 2007a, p. 14). This project-level analysis of soil resources compares alternatives based on the potential effects from proposed activities, the extent of affected land area and the likelihood of long-term impairment. The evaluation of effects considers site-specific conditions as well as general effects of the proposed activities analyzed in the Forest Plan FEIS (USDA-FS 2007b, pp. 3-7 to 3-21).

The Forest Service Handbook describes seven categories of detrimental soil conditions that may result from forest management activities: compaction, displacement, puddling/rutting, fire damage, erosion, lack of cover vegetation and mass movement (USDA-FS 2005, p. 5). These detrimental soil conditions should be limited to the extent possible, and should account for less than 15% of the land in areas with proposed activities (USDA-FS 2005, p. 6). Short-term effects on soil are usually relatively small and recover as vegetation reestablishes on disturbed areas, whereas activities that displace the upper portions of the soil profile (topsoil) without plans for replacement are more likely to result in long-term effects. Because the effects of activities depend on soil type and slope, these variables were also considered when evaluating the potential effects of proposed activities.

Acres impacted by soil disturbing activities were estimated from field visits and past experience with similar projects. These estimates were used to determine if the area of detrimental soil conditions is likely to exceed the threshold of 15% of the total acres of the areas with proposed activities (harvest units and road corridors). Soils designated as “Prime farmland” and “Farmland of Statewide Importance” are federally designated by the USDA-Natural Resource Conservation Service.

The analysis below assumes that project implementation would follow Forest Plan standards and guidelines to prevent detrimental soil conditions when possible and minimize long-term loss of soil quality when short-term disturbance cannot be avoided (USDA-FS 2007a, pp. 72-73). Specific data, field notes on soil conditions in the Morrison Run project area and other relevant background information are in the project file.

Environmental Consequences

IM-7: Effects of the alternatives on long-term soil productivity.

Direct and Indirect Effects

Selection of Alternative 1 (No Action) would result in no soil disturbance from new Forest Service activities. However, this alternative could have some negative effects on soil resources because the proposed road work (decommissioning and reconstruction/addition to Forest Service system) would not occur. Both of these activities would improve the condition of poorly maintained roads either by re-vegetating and removing culverts or by upgrading surfaces to a higher standard required for Forest Service system roads. Alternative 1 would also allow existing pits to remain bare and potentially erode.

Alternatives 2 and 3 would have similar effects on soil resources, with slightly less soil disturbance resulting from Alternative 3 due to reduced timber harvesting (and associated activities) and no new road construction. Neither Alternative 2 nor 3 would likely have long-term effects on soil productivity at the scale of treatment units or the entire project area.

- Timber harvesting activities would result in relatively small-scale and short-term soil compaction, puddling/rutting and localized erosion due increased traffic on unpaved roads, use of heavy machinery in the stands, and activities required for log skidding and landing. Alternative 2 proposes approximately 1,399 acres of commercial timber harvests and Alternative 3 proposes approximately 1,120 acres of such treatments. Based on previous experience with such activities and field surveys of the sites proposed for timber harvest, these soil disturbances would account for 10% or less of the treatment unit area (i.e., <140 acres for Alternative 2 and <112 acres for Alternative 3). Both alternatives propose commercial timber harvests in areas with potential equipment limitation due to wet soils or steep slopes (Alternative 2 – 949 acres, Alternative 3 – 780 acres), including proposed treatments on less than one acre of Group 3 soils in compartment 451, stand 06. However, restricting these activities to drier periods and avoiding perennially wet sites or those with extremely steep slopes would reduce the likelihood of harmful effects. Both alternatives also propose commercial timber harvests in protected farmland (Alternative 2 – 139 acres, Alternative 3 – 118 acres), but timber harvesting does not remove topsoil, cover the surface or otherwise impair land designated as Prime Farmland or Farmland of Statewide Importance. The soil effects of low-intensity vegetation management such as release, non-commercial thinning and understory treatments are negligible.
- Proposed road work and stone pit expansion would result in long-term losses of soil productivity at the site of new road construction and short-term disturbances associated with road reconstruction and pit excavation. Alternative 2 proposes approximately 4,660ft of new road construction in wet soils with moderate equipment limitation and 1,900ft of new road construction in a soil designated as Prime Farmland. The new construction in Prime Farmland would result in a conversion of less than 1 acre. The proposed reconstruction of road in existing corridors, addition of non-system roads to the Forest Service system and road decommissioning under both Alternative 2 and 3 would reduce erosion potential by repairing and maintaining roads to a higher standard.
- Prescribed fire will result in short-term removal of some vegetation and litter and may increase soil pH. However, the fires proposed by Alternatives 2 and 3 would likely be very low-intensity and any effects to soil would rapidly diminish due to revegetation. In fact, low intensity fire can facilitate nutrient cycling and increase availability of some plant nutrients.
- The Forest Plan FEIS determined that application of glyphosate and sulfometuron methyl will not adversely affect soil nutrient cycling, soil microorganisms or soil productivity (USDA-FS 2007b 3-12; USDA-FS 2007e, G1-104 – G1-106, G1-42 – G-44).
- The proposed treatment of non-native invasive plants (NNIP) could result in soil disturbance if heavy equipment is required to treat these species. Of the 427 acres of proposed treatment, approximately 205 acres are in soils designated as suitable for

farmland. Treatments of individual plants or colonies usually affects less than one acre. If mechanical treatment of NNIP displaces topsoil, the removed soil would be replaced and resurfaced to prevent detrimental soil conditions.

- The proposed fertilization to encourage forest regeneration may alter soil nutrients through base cation loss. However, young trees rapidly uptake most nutrients and proper application should minimize substantial nutrient loss or other potential effects to soil chemistry (USDA-FS 2007b, p. 3-12)

None of the other activities proposed in Alternatives 2 and 3 are likely to result in any effects to soil resources beyond small-scale and short-term impacts. Soil productivity, including physical, chemical and biological components, rapidly recovers from such disturbances.

Cumulative Effects

The effects of the alternatives described above would occur in the context of natural processes, previously approved and normal maintenance activities, activities on private land in the project area and private OGD on ANF land. These activities are reasonably foreseeable regardless of the alternative selected for the Morrison Run project. Activities on private land are difficult to predict so, for purposes of this analysis, private land within the project area is assumed to experience a range of activities similar to that on National Forest land.

Natural weathering, soil erosion, soil formation and soil acidification due to atmospheric acid deposition would continue to occur at background levels. None of these processes are likely to result in large-scale detrimental soil conditions in the project area.

Approximately 72 acres of previously approved timber harvests are reasonably foreseeable. As discussed above for the proposed new timber harvests, these would result in soil disturbances on less than 10% of the treatment area (<7 acres) and these effects would recover through remediation and natural processes. Road maintenance activities are also reasonably foreseeable under all three alternatives. Most normal road maintenance activities may result in short-term and small-scale soil disturbances but have a longer-term effect of stabilizing roadside soil and reducing erosion potential.

The best available data show 1,189 existing oil and gas wells in the Morrison Run project area. A site-specific projection of future private OGD suggests that construction of approximately 608 new wells is reasonably foreseeable in the project area (Appendix D). This would result in 790 acres (~4% of the project area) of additional long-term commitment of land area for access roads, well pads, tank batteries, and other infrastructure. These areas will experience soil disturbance associated with initial development, compaction in areas experiencing high vehicle traffic and increase potential for erosion due to repeated disturbance, inadequate road maintenance and ineffective rehabilitation after wells and roads are no longer in use (USDA-FS 2010a). Existing and

reasonably foreseeable private oil and gas development are likely to result in long-term detrimental soil conditions on approximately 1,979 acres (~10% of the project area).

When the direct and indirect effects of the proposed actions are considered in the context of the reasonably foreseeable activities described above, detrimental soil conditions are likely to occur on between 10 and 15% of the project area over the time frame of the cumulative effects analysis. Private OGD is the largest source of this potential soil disturbance, and activities proposed in Alternatives 2 and 3 would contribute relatively little to long-term loss of soil productivity. It is unlikely that detrimental soil conditions will occur on more than 15% of the project area at any given time during the cumulative effects analysis time period because the proposed activities and future private OGD would not occur simultaneously and many small-scale soil disturbances will recover during the analysis period.

E: Hydrology

Analysis Framework

Hydrologic resources in the project area are associated with streams, springs, seeps, and riparian corridors. For this project, it also includes the Allegheny Reservoir that borders much of the area. Waters are classified by PA DEP and have designated protected uses (PA-DEP 2010). For this project, most of the waters are classified as High-Quality Coldwater Fishery, with some streams a Cold Water Fishery designation and the Allegheny Reservoir a Warm Water Fishery. Morrison Run is also a Remote Trout Stream as designated by the ANF. Streams and wetlands in the project area are afforded protection with standards and guidelines in the Forest Plan (USDA-FS 2007a) to help maintain their designated uses.

Riparian zones occur along perennial and intermittent waterways and are generally wider along larger streams and rivers (USDA-FS 2007b). Using Lidar streams in GIS and the riparian buffers established in the 2007 Forest Plan, there are 3,388 acres of riparian buffers in the hydrology cumulative effects area. The National Wetland Inventory (NWI) recognizes 36 wetlands totaling 200 acres of wetlands in the same cumulative effects area, with most being in the Chappel Fork corridor along the stream as well as along the Allegheny Reservoir.

Increased stream flow is expected to occur when more than 25 percent of a watershed changes from forested to regenerating forest in a 5 year period (Hornbeck and Kochenderfer 2000, Lynch and Corbett 1990). The quantity of water is related to the amount of basal area removed (as a result of a final harvest that includes overstory removals, shelterwood removals and two-aged removals) in any given year over the analysis period of 2012-2031, as well as the amount of vegetation removal associated with new road construction and new oil and gas development. Even-aged harvests result in a vigorous increase in herbaceous vegetation, shrubs, and tree seedlings. Once this flush of understory vegetation is established, changes to stream flow would be diminished to pre-harvest conditions.

Water quality, water quantity, and aquatic habitat are indicators that help describe hydrologic conditions in a forested setting. Their change in condition can be assessed by whether proposed activities would meet standards and guidelines or established criteria. Vegetation

treatments would be spread out over a 20-year period and are spread over three subwatersheds (Chappel Fork, Kinzua Creek (lower), Reservoir (lower)).

Environmental Consequences

IM-8: Effects of the alternatives on aquatic habitat conditions.

Direct, Indirect, and Cumulative Effects

This indicator measure addresses the proposed placement of large wood into three streams. The placement of this wood would have a direct effect on stream channels and the habitat of aquatic species, but there would be no indirect or cumulative effects.

For Alternative 1, the three streams would likely continue to have reduced quantities of effective large wood, lack of pools, and have limited high-quality pool habitat during the 20-year analysis period. Pigeon Run has only 0.5% pool area which is far below the Forest Plan objective of 35-65%. Similarly, Morrison Run only has 12% in pool area. Hemlock Run is more similar to Morrison Run based on a visual assessment. Large wood in the streams, while within the Forest Plan objective of 75-380 pieces/mile, is dominated by smaller and shorter pieces. Morrison Run, with a gradient of 2.0%, however, seems to be responding better even though its amount of current wood is only about two-thirds of Pigeon Run. Pigeon Run is a high gradient stream at 3.6%. In the long-term (beyond 20 years), as streamside trees become older and more decadent, a percentage of them will fall into the stream naturally creating more favorable aquatic habitat conditions.

For Alternative's 2 and 3, large wood added to streams would increase stream channel complexity and aquatic habitat, but only minimally due to the very low amount that would be added. Because of their lower stream gradients, Morrison and Hemlock Runs are expected to respond more to the addition of large wood than would Pigeon Run. The wood to be added is expected to disperse flood flows, trap sediment, and create cover and deeper pools. Large wood placement may cause some localized erosion, but it is not expected to divert streams or increase flooding. The creation of more and deeper pools provides areas for larger fish, including native brook trout.

IM-9. Effects of the alternatives on water quality.

Direct and Indirect Effects

There would be no direct effects from the proposed activities to water quality. For Alternative 1, high quality surfacing would not be placed on the 1.86 miles of FS roads identified from field surveys in the project area as having runoff concerns where roads would be used to haul timber. This would allow for a higher amount of runoff to continue as a result of fine particles from current pit-run surfacing contributing to sedimentation (Trieu 1999). Where sedimentation reaches streams, pools can become shallower and substrates become more embedded. Springs and seeps do not have the ability to flush fines, so the impact is more long-lived where sediment reaches these areas. Additionally,

the proposed road reconstruction or decommissioning would not occur. The roads identified for decommissioning are mostly within 300' of two streams.

For Alternatives 2 and 3, high quality surfacing would be applied on 1.86 miles of existing FS system roads that are within 300 feet of a stream or have runoff concerns (see Appendix A). Improved road surfacing will reduce sediment delivery to streams and other water resources when compared to current pit run surfacing (Trieu 1999). This decrease in sedimentation will benefit water quality, aquatic habitat, and population health of fish and aquatic invertebrates. Under Alternative 2, 0.7 miles of new FS road construction is proposed; however, they would not be within 300 feet of a stream or have runoff concerns and therefore no effects to water resources are anticipated. There is no proposed new road construction in Alternative 3 and thus no effects.

Under Alternative 2, 10.2 miles of existing road corridors would be reconstructed to Forest Service standards; while under Alternative 3 the amount that would be reconstructed is 8.0 miles. Because these roads, which are currently non-system or old woods roads, were not reviewed specifically for runoff concerns, it is unknown what amount of high quality surfacing is needed. To address this, the Forest Plan guideline of using high-quality surfacing within 300 feet of streams was used with GIS to help identify sections where high-quality surfacing may be beneficial. Several sections appear to be within 300 feet and cross some drainages. Field verification during road design will be required to determine where these sections are and where runoff is a concern. The proposed roads include 147A, 268AA ext., 268B, 268C, 511, 515A, and 657 for Alternative 2, and Alternative 3 is the same minus proposed road 515A.

Decommissioning of Forest Service and non-system roads in Alternatives 2 and 3 would result in removing hydrologically connected sections with runoff concerns. This would provide benefits over the long-term by reducing compacted surfaces and restoring natural flow of water resources. During the decommissioning work, there will be a short-term disturbance to soils, but these effects should be minimal and will dissipate once vegetation becomes established.

Herbicide treatments are expected to have no direct or indirect effects on water quality (USDA-FS 2007b, pp. 3-45 and 3-46). Under Alternative 2, herbicide applications are proposed on 7.0% (up to 1336 acres) of the project area and in Alternative 3 up to 1123 acres (5.8%). Where treatments overlap streams or riparian areas, those resources would be protected through buffers identified in the herbicide standards of the Forest Plan (USDA-FS 2007a, pp. 57-58). Similarly, Forest Plan standards and guidelines would be implemented for timber harvesting activities minimizing any potential effects to water resources (USDA-FS 2007b, p. 3-43).

Cumulative Effects

Cumulatively, and based on GIS, there are 116 miles of non-system roads within 300' of a Lidar displayed stream (35 miles when using USGS topographic streams). These roads were not assessed for runoff concerns, so it's unclear how many of these miles are actually contributing runoff. However, based on surveys of other non-system roads in

other parts of the Forest, it is likely that some of the non-system roads are contributing sediment to nearby streams.

In 2009, numerous stream fords and cross-country ATV trails were re-inventoried in the project area and found to still be contributing sediment to several streams. The fords and trails were created by private OGD driving ATV's cross-country in the project area to access their wells. The impacted drainages include North Fork Chappel Fork and Bump Run. These fords and trails are assumed to be driven daily to tend the wells on both sides of State Route 321. The result is raw soil that is continually exposed to the weather and contributes sediment to streams and ultimately the Allegheny Reservoir. As well, these trails have taken forested areas out of production, have contributed to soil loss, and have impacted one wetland along North Fork Chappel Fork.

Pennsylvania Best Management Practices establish guidelines for oil and gas development to control erosion, sedimentation and impacts to streamflow from road and well pad construction. However, it is likely based on past experience that future private OGD in the project area could have negative effects on water quality, including increased sedimentation in streams due to construction of roads and well pads and potential pollution from inadequately contained waste chemicals or oil.

Despite the potential impacts to water quality due to private oil and gas activities, the activities proposed for the Morrison Run project are not expected to result in negative cumulative effects on water quality.

IM-10: Effects of the alternatives on water quantity.

Direct and Indirect Effects

There would be no direct effects from the proposed activities to water quantity. Under Alternative 1, there is no Forest Service activity that would result in a reduction of basal area (Table 17).

For indirect effects under Alternative 2, forest in the 0-5 age class would increase to a maximum of 1,287 acres in the year 2026 from final harvest activities. Considering the proposal to construct 0.7 miles of new FS road (2 acres), a maximum of 1,289 acres would be in the 0-5 age class in the next 20 years, resulting in a BA reduction of 4.4%.

For Alternative 3, the maximum BA reduction from final harvests would occur in the year 2021 when 1,066 acres would be in the 0-5 age class. No new FW road construction would occur; therefore the total BA reduction from FS activities is 3.7%.

Table 17. Basal area reduction from proposed timber harvest from 2012-2031.

Alternative	Harvested acres	New FS Roads (acres)	Total Acres	BA Reduction
1	0	0	0	0
2	1,287	2	1,289	4.4
3	1,066	0	1,066	3.7

The BA reduction would not exceed 25% from Forest Service activities in any of the alternatives. Therefore, increases in streamflow and the possible effects on stream channel physical features as a result of BA reduction are not anticipated.

Cumulative Effects

Over the next 20 years, approximately 878 new private oil and gas wells could be developed on private and National Forest System lands in the cumulative effects area. This would result in new ground disturbance of up to 4 percent (1,141 acres) of the cumulative effects area. This includes an estimate of the acreage in well pads, roads, tank batteries and associated utility rights-of-ways. On an annual basis, this equates to 57 acres per year (285 acres over any 5-year period) of BA reduction. A portion of the acreage will re-vegetate each year, and the forested sections along roads and well pads will absorb runoff as long as it is not reaching a stream.

Private lands account for 7,552 acres in the cumulative effects boundary. Of this amount, 6,705 acres are considered forested. A large portion (5,906 acres) of the total private land within the cumulative effects boundary is under one ownership and has had extensive timber harvest activity that occurred in the 1990's. Most of this large block is now regenerated. For the remainder of the private lands that have not had a final harvest cut, the assumption is made that 45 acres will have some form of final harvest activity occurring annually during the analysis timeframe. Thus, there would be an estimated 225 acres of 0-5 year age class on private land at any one time during a five year period. This is likely a high estimate given the fact that the one large block of private timber was mostly final harvested in the 1990's and will not see that kind of cutting until well beyond the 20 year analysis timeframe.

The maximum basal area reduction for the cumulative effects area is shown in Table 18. In Alternative 1, the maximum amount of BA reduction in any one year during the analysis period is 527 acres from FS activities (final harvest) from a previously approved project (Upper Kinzua), while non-FS activities account for 510 acres. The result is a maximum 3.6% BA reduction in any one year during the 20 year analysis period.

For Alternative 2, FS final harvests reach a maximum of 1,287 acres during one year only. Additional acres are added with the construction of 0.7 miles of road (2 acres). Combined with private OGD and other non-FS activities, the maximum amount of BA reduction that would occur in any one year during the 20 year analysis period is 6.2%.

Under Alternative 3, the maximum BA reduction from FS final harvest occurs in one year only, resulting in 1066 acres in the 0-5 age class. No new road construction will occur by the FS. Considering the amount of private OGD and timber harvesting activities, the BA reduction would reach a level of 5.4% at the maximum during the 20 year analysis period.

Table 18. Maximum basal area reduction within the cumulative effects boundary from 2012-2031.

Alternative	FS Final Harvest (acres)	Non-FS Final Harvest (acres)	New Private OGD (acres)	New FS Roads (acres)	Total Acres	BA Reduction
1	527	225	285	0	1037	3.6
2	1,287	225	285	2	1799	6.2
3	1,066	225	285	0	1576	5.4

The BA reduction would not exceed 25% from Forest Service activities when considered in the context of other reasonably foreseeable activities in the cumulative effects analysis area. Therefore, increases in streamflow and the possible effects on stream channel physical features as a result of BA reduction are not anticipated.

Water withdrawal may occur in the process of private oil and gas development for well drilling or hydraulic fracturing. Deep shale gas operations require approximately 100 times more water than a single shallow well, but recent projects have hauled water rather than used available surface or subsurface water from the development site. Deep shale developers are required to submit Water Management Plans to the Pennsylvania DEP describing expected water use and disposal. The Pennsylvania DEP reviews these plans for individual and cumulative impacts and water use will only be approved if existing and designated water uses are maintained. Regardless of the source of water for private oil and gas operations, the proposed activities are not expected to decrease water quantity and so they have no negative cumulative effects on this resource.

F: Air quality

Analysis Framework

The Clean Air Act, last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six common air pollutants (US EPA 2008a; US EPA 2008b). These “criteria pollutants” are commonly found and can be hazardous to human health, the environment, and can potentially cause property damage. The EPA regulates these six pollutants by setting scientifically-based permissible levels. The six criteria pollutants identified by the EPA are: ground-level Ozone (O₃), Sulfur Dioxide (SO₂), Carbon Monoxide (CO), Nitrogen Dioxide (NO₂), Particulate Matter (PM_{2.5}, PM₁₀), and Lead (Pb).

Ozone, which occurs naturally in the stratosphere, protects life on Earth. However, ground level ozone (smog) is harmful and is created by a chemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. The proposed activities which may create O₃ include motor vehicle exhaust and gasoline vapors from timber harvest and oil and gas activities. Pennsylvania O₃ levels are attributable to local

influences and, to a more significant extent, to O₃ and O₃ precursors transported from outside Pennsylvania from states to the south and west (US EPA 2009).

Sulfur dioxide is a highly reactive gas which has adverse effects on the respiratory system and is created by fossil fuel combustion at power plants and other industrial facilities. Other sources include industrial processes such as extracting metal from ore, and burning high-sulfur-containing fuels by locomotives, large ships, and non-road equipment. The proposed activities which may create SO₂ include diesel powered equipment utilized during timber harvesting.

Carbon monoxide is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust which contributes over half of CO emissions nationwide. Other sources include construction equipment, industrial processes, residential wood burning and prescribed or wildland fires. The proposed activities which may create CO include vehicles and equipment used for timber harvesting and prescribed fire.

Nitrogen oxides (NO_x) are a group of highly reactive gasses for which nitrogen dioxide is the indicator. Emissions from cars, trucks and buses, power plants, and off-road equipment create NO₂ which contributes to ground-level ozone, and fine particle pollution. Particulate matter is composed of small particles and liquid droplets which can be inhaled and affect the heart and lungs. PMs that are between 2.5 and 10 micrometers are “inhalable coarse particles” found near roadways and dusty industries. PMs that are 2.5 micrometers and smaller are “fine particles” found in smoke or haze. Smoke from prescribed fires and emissions from motor vehicles are potential sources of these PMs. Smoke plumes from prescribed fire with high particulate concentrations may also reduce visibility at intersecting roads and highways.

Lead smelters are the leading cause for lead emissions and, to a lesser extent, waste incinerators, utilities and lead-acid battery manufacturers. The nearest lead smelter is located in southwestern Pennsylvania, about 128 miles from the ANF.

Monitoring of the NAAQS occurs at the state level and is enforced through EPA-approved State Implementation Plans. The plans typically include a collection of monitoring devices throughout the state which provide actual measurements of the concentrations in the air and identify whether an area is meeting the air quality standards. Those areas which do not meet the standards are considered in “nonattainment” status and must implement strategies which will reduce emissions. This analysis uses the most current information available from the PA Department of Environmental Protection and EPA websites and assumes that the monitoring stations which are located in highly urbanized areas are an overstatement of expected values on the ANF. This assumption is based on the knowledge that the combined ANF four-county population estimate for 2008 (total: 123,294; Elk - 32,274, Forest - 6,808, McKean - 43,436, Warren - 40,776) is less than half the 2008 population of Erie County (279,647) (US Census Bureau, Population Estimates Program). The nearest EPA-approved monitoring stations for O₃, CO, NO₂ and PM_{2.5, 10} are located in Erie, PA. In addition, there is a long-term O₃ monitoring station located in the Kane Experimental Forest (KEF) in Elk County, PA, which

is not approved for regulatory monitoring. Two EPA-approved monitors for SO₂ are located in the city of Warren, PA. The nearest two monitors for lead are located near Pittsburgh, PA (graphs and explanations can be found online <http://www.epa.gov/air/urbanair/> and in the project file).

At the time of this analysis, the region was in attainment of all NAAQS (Table 19).

Table 19. Criteria Pollutant monitoring data, NAAQS compared to 2009 PA DEP measurements.

Criteria Pollutant	Primary National Ambient Air Quality Standard (Averaging Time)	2009 PA DEP Bureau of Air Quality Air Monitoring Data	Attainment
O ₃	0.075 ppm (8 hr)	0.075 ^a ppm	Yes
SO ₂	0.14 ppm (24 hr)	0.021 ^b ppm	Yes
CO	9.0 ppm (8 hr)	1.2 ^a ppm	Yes
NO ₂	0.100 ppm (1 hr)	0.067 ^a ppm	Yes
PM ₁₀	150 µg/m ³ (24 hr)	76 ^c µg/m ³	Yes
PM _{2.5}	15.0 µg/m ³ (Annual)	14.0 ^d µg/m ³	Yes
Pb	0.15 µg/m ³ (3 month average)	0.12 ^e µg/m ³	Yes

^a An average of monitors located in Erie and Pittsburgh, PA

^b An average of two monitors located in Warren, PA

^c Monitor in Erie, PA

^d Average of Erie, PA and Southeast PA

^e Average of two Pittsburgh monitors

Environmental Consequences

IM-11: Effects of proposed activities on the attainment of National Ambient Air Quality Standards

Direct and Indirect Effects

Proposed activities that generate emissions include operation of engines used to perform silvicultural treatments and prescribed fires. For Alternative 1, there would be no prescribed fires or newly proposed silvicultural activities in the project area on national forest lands and thus no additional emissions of pollutants. Alternative 2 will implement all the treatments proposed including all silvicultural activities and prescribed burning. For newly proposed timber harvest on ANF lands, there are 11.6 MMBF expected to be removed in the first 5 years and 14.1 MMBF expected in the following 10 years. The greatest amount of acres that could be prescribed to burn in one year for Alternative 2

will be 364 acres of forested lands, and 4 acres of openings for wildlife habitat improvement (warm season grasses).

Alternative 3 differs from Alternative 2 in that there is a reduced amount of timber harvesting and prescribed burning proposed. In Alternative 3, for newly proposed timber harvest on ANF lands, there are 9.3 MMBF expected in the first 5 years and 11.1 MMBF expected in the following 10 years. The greatest amount of acres that could be prescribed to burn in one year for Alternative 3 will be 327 acres of forested lands, and 4 acres of openings for wildlife habitat improvement (warm season grasses).

The amount of pollutants added to the atmosphere by dispersed proposed activities listed above is not expected to exceed the national standards. The impact of each activity on air quality is quickly diffused due to the amounts projected over time and space within the project area. Small prescribed fires are short lived, and last only a matter of hours. Burn plans would address general concerns with prescribed fires, such as reduction in visibility or to inhalation of fine particulates. Mitigations will be employed in smoke sensitive areas to avoid concentrating smoke in population concentrated areas.

The KEF ozone monitoring station does not qualify as a NAAQS monitoring station, but average ozone concentration at the KEF monitoring station from 2006-2008 was 0.073 ppm (0.002ppm below the NAAQS). Further discussion on ozone monitoring, including a graph demonstrating the downward trend of ozone measurements at the KEF from 1989-2008, can be found in the Programmatic Effects of Private Oil and Gas Activity on the Allegheny National Forest, Air Report (USDA-FS 2010c, unpublished).

Cumulative Effects

The largest emissions of O₃ precursors (VOC and NO_x) are due to private OGD (Table 20). Private OGD emissions include all the equipment from the normal maintenance of operating wells in addition to predicted emissions from new well development. Increases in emissions from private OGD between 2010 and 2020 are due to additional wells that are anticipated to be developed within the project area. However, it is expected that ozone concentrations will continue to decrease in the four-county area as measured at KEF, since ozone precursors (VOC and NO_x) are predicted to be lower in 2020 than in 2010, due to improved efficiencies which would reduce vehicle and equipment emissions per unit.

Particulate matter is expected to increase in the county and in the project area. It is not expected that the EPA will regulate either particulate matter released from agriculture or increased vehicle traffic on dirt roads. For PM, the largest emissions are for Alternates 2 and 3, which are due to prescribed fire. The emissions from prescribed fire are of a short duration and prescribed fires will only be accomplished on days when the smoke will disperse rapidly. Therefore, it is not expected that the emissions from the ANF will have an effect on the continued attainment status for PM in the project area.

Carbon monoxide emissions are greatest for private OGD. As shown in Table 20, CO measurements by PA DEP in Erie and Pittsburgh are well below the NAAQS. Expected CO emissions due to the proposed action are not expected to have an effect on the continued attainment status for CO in the project area.

SO₂ levels in the area are expected to continue to decrease with increased pollution controls on major emission sources and with the reduced levels of sulfur proposed for diesel and home heating oil. Emissions from non-road engines, as part of these proposed actions, are not expected to have an effect on the continued attainment status for SO₂ in the project area.

Lead is not discussed in this report because none of the proposed activities will contribute to air quality emissions for this pollutant. In Pennsylvania, only portions of Beaver and Berks Counties are considered to be in nonattainment for lead as part of initial EPA designations in November, 2010 (US EPA 2010).

The US EPA, New York State and the Commonwealth of Pennsylvania are studying the possible effects that Marcellus shale wells have on the environment, including emissions from construction and operation of well pads that could affect air quality. The National Energy Technology Laboratory monitored air quality on the ANF in 2010 preliminary results suggested that development of a Marcellus shale well site in the project area could result in some locally elevated emissions but would not result in exceeding any of the NAAQS.

Table 20. Estimated emissions for prescribed fire, timber harvest, and private OGD for the project area compared to the 4 county area.

	Pollutant	Prescribed Fire Emissions (Tons)			Timber Harvest Emissions (Tons/Year)			Private OGD Emissions (Tons/Year)		
		2011	2015	2020	2011	2015	2020	2011	2015	2020
Alt. 1	VOC	0	0	0	0	0	0	31	34	38
	PM	0	0	0	0	0	0	8	9	10
	NO _x	0	0	0	1	1	1	159	173	191
	CO	0	0	0	4	4	3	330	360	396
Alt. 2	VOC	0	8	8	0	2	1	31	34	38
	PM	0	18	18	0	0	0	8	9	10
	NO _x	0	3	3	1	6	4	159	173	191
	CO	0	183	183	4	18	12	330	360	396
Alt. 3	VOC	0	7	7	0	2	1	31	34	38
	PM	0	16	16	0	0	0	8	9	10
	NO _x	0	3	3	1	5	3	159	173	191
	CO	0	165	165	4	16	10	330	360	396

	Pollutant	ANF Emissions, including Private OGD (Tons/Year)			4 County Emissions (Tons/Year)			Percent of 4 County Emissions from ANF, including private OGD		
		2011	2015	2020	2011	2015	2020	2011	2015	2020
Alt. 1	VOC	31	34	38	9,858	8,886	7,671	0.31	0.38	0.50
	PM	8	9	10	3,939	4,151	4,416	0.20	0.22	0.23
	NO _x	160	174	192	10,459	10,135	9,731	1.53	1.72	1.97
	CO	334	364	399	54,890	49,613	43,018	0.61	0.73	0.93
Alt. 2	VOC	31	44	47	9,858	8,886	7,671	0.31	0.50	0.61
	PM	8	27	28	3,939	4,151	4,416	0.20	0.65	0.63
	NO _x	160	182	198	10,459	10,135	9,731	1.53	1.80	2.03
	CO	334	561	591	54,890	49,613	43,018	0.61	1.13	1.37
Alt. 3	VOC	31	43	46	9,858	8,886	7,671	0.31	0.48	0.60
	PM	8	25	26	3,939	4,151	4,416	0.20	0.60	0.59
	NO _x	160	181	197	10,459	10,135	9,731	1.53	1.79	2.02
	CO	334	541	571	54,890	49,613	43,018	0.61	1.09	1.33

The incremental effects of management activities on the ANF are very small compared to emissions from private oil and gas activities on the Forest and to the total emissions in the region. Furthermore, the cumulative effect of past, present and reasonably foreseeable future federal and non-federal actions are not expected to bring any of the criteria air pollutants to levels that exceed the NAAQS.

G: Human Health and Safety

Analysis Framework

The herbicides glyphosate and sulfometuron methyl are used to control interfering vegetation for forest management and to treat non-native invasive plants on the ANF. Human risks are discussed in the Forest Plan FEIS (USDA-FS 2007a) and the Forest Plan, Appendix G (USDA-FS 2007d). Broadcast treatments are generally completed a substantial distance away from private residences and their water sources. In the project area, 80% of the broadcast applications are greater than 1000' from known non-Forest Service structures. Application does not occur closer than 150' from private residences. In all cases of broadcast herbicide application, the treatment will be applied when there is minimal risk of accidental exposure. Warning signs, maximum wind caps (10 mph), directional spraying (near property lines and trails), landowner notification, timing, and buffers will further minimize accidental contact. More information regarding herbicide use and its safety may be found in the Forest Plan (USDA-FS 2007, pp. 54–59; p. A-33–A-38), the Forest Plan FEIS (USDA-FS 2007a, pp. 3-119–3-122), or Appendix G to the Forest Plan FEIS (USDA-FS 2007a).

The boundary of the proposed Morrison Run project encompasses 368 acres to be managed with prescribed fire or planned ignitions. Prescribed fire will be utilized within 15 stands for cultural resource, vegetative, and wildlife management to restore and maintain fire adapted

ecosystem structure and function (e.g., oak and warm season grass cover types) and to increase forest health (USDA-FS 2007a, pp. 19, A-13 to A-16). Fire, a natural component of these ecosystems, has been absent or suppressed on the ANF for many years (Brose, unpublished). As such, fire adapted ecosystems and their associated vegetation community types are reverting away from historic fire regimes.

No comments were received during the scoping period regarding prescribed fire management activities within the Morrison Run project area. However, several comments were received concerning slash production, from vegetative management activities and activities associated with oil and gas development. The comments implied that slash and other materials left behind from commercial and noncommercial vegetation treatments would increase the risk of wildfires within the project area.

A majority of the wildfires on the Allegheny National Forest (ANF) are a product of human ignition. From 2000 through 2010, 129 wildfires were reported within the Proclamation Boundary of the ANF (USDA FS, Fire Statistics System [FIRESTAT]). Of these 129 fires, 96 were recorded as being caused by human activities. Four were recorded as being caused by lightning and 29 were “miscellaneous-other”.

The production of slash and other materials from vegetative management activities and activities associated with OGD alone does not increase the risk of wildfire ignitions or fire danger. To correctly assess the susceptibility of an area to the risk of wildfire, additional variables or factors, such as the fuel type supporting the fire, current weather conditions, moisture content of the fuels being consumed, and topography need to be cumulatively considered.

On the ANF, wildfire risk or fire danger is determined by the National Fire Danger Rating System (NFDRS) (USDA-FS, ANF 2010d; NWCG, 2002). The NFDRS is a tool to assist ANF staff with day-to-day decisions. Its calculations or outputs are based on several variables: fuel type which will be carrying or supporting the fire, weather observations, and topography. Fire danger is reports as either current (Observed) or future (Forecasted). The accuracy of Forecasted outputs may decrease because the accuracy of the NFDRS output is subject to the accuracy of the predicted weather data (NWCG, 2002). These outputs are best used when computed for larger- often tens of thousands of acres- geographic areas. This rating describes the conditions that reflect the daily wildfire potential for an area (NWCG, 2002).

For the majority of the ANF, two fuel models are utilized. The first is hardwood leaf litter, after fall leaf off and the second is hardwood leaf litter, after spring canopy leaf out. These two fuel models best represent the majority of fuel types found on the ANF within the Morrison Run project area 1,280 acres are proposed for vegetative management treatments. These acres are not contiguous and are scattered throughout the project area. Additionally, not all of the vegetative treatments will produce slash or other debris. There are NFDRS fuel models for slash, however, the percent of the overall area where slash will be produced (i.e., acres of stands to be treated within the Morrison Run project area compared to the acreage of

the ANF) is very small and changing the NFRDS fuel model for these small areas is not recommended. Additionally, NFRDS is not sensitive enough to predict fire danger for such a small areas.

IM-12: Effects of the alternatives on fire danger risk.

Direct, Indirect, and Cumulative Effects

There are no anticipated direct or indirect effects of any of the alternatives on fire danger rating in the Morrison Run project area. For Alternative 1, the lack of management activities would not change the method or fuel model utilized to predict fire danger within the project area. NFRDS outputs will be produced, based on the two fuel models described previous. For Alternatives 2 and 3, slash production within the project area, also would not change the fuel model utilized for the NFRDS model.

H: Recreation Opportunities and Forest Settings

Analysis Framework

The Recreation Opportunity Spectrum (ROS) is an inventory system used for planning and managing recreational setting by distinguishing the varying conditions and qualities in the landscape. Indicators such as access, site management, visitor management, social encounters, and visitor impacts help to determine ROS settings. Recreational settings are arranged along a continuum of seven ROS classes progressing from least to greatest development: primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, roaded modified, rural and urban. On the ANF, ROS classes range from semi-primitive non-motorized to rural. The Morrison Run project area is located in Roaded Natural ROS settings (MAs 2.2, 3.0, and 7.1).

The following analysis evaluates if the effects of the alternatives would change the ROS of the project area based on the ROS descriptions (USDA-FS 2007a, p. C-1 to C-2). Roaded Natural ROS settings are characterized predominantly by a naturally-appearing environment, moderate to high interactions between users but with little opportunity for challenge and risk. Roaded Modified ROS settings typically have vegetative and landform alterations, timber management activities, and the opportunity to get away from others but with easy access.

Recreation activities and use patterns that occur within the Morrison Run project area range from recreation activities in dispersed undeveloped areas to activities in highly developed areas. Dispersed recreation activities include hiking and backpacking on the highly popular Morrison Trail and on the less crowded North Country National Scenic Trail, hiking on the Rimrock Trail, camping at sites along Forest Road 267, hunting, fishing, wild berry picking and wildlife viewing. Developed recreation activities include camping at two campgrounds adjacent to the Allegheny Reservoir, picnicking and swimming at the Kinzua Beach Recreation Area, picnicking and enjoying the panoramic views at Rimrock Overlook, and boating on the Allegheny Reservoir after launching at the Kinzua-Wolf Run Marina or Dunkle Corners.

The following analysis also evaluates if the effects of the alternatives would change recreation activities and use patterns based on field observations and known preferred recreation settings for various dispersed and developed recreation activities.

Environmental Consequences

IM-13: Effects of the alternatives on Recreation Opportunity Spectrum (ROS).

Direct and Indirect Effects

In Alternatives 1, 2 and 3, there would be no direct effects to the ROS. Indirect effects on recreation could include a loss of solitude due to machinery noise and vehicle traffic, easier access due to additional roads, and modifications to the environment due to vegetation management and additional roads. However, these changes would not change the ROS of the project area.

Cumulative Effects

In Alternatives 1, 2 and 3, cumulative effects could occur to the ROS in the context of expanding private OGD, specifically increased road density, traffic and noise. The proposed activities could contribute to a change in the ROS from Roaded Natural to Roaded Modified when considered in the context of current and reasonably foreseeable private OGD, other activities on private land and previously approved Forest Service activities in the cumulative effects area.

IM-14: Effects of the alternatives on stand-level changes to recreation activities and use patterns.

Direct and Indirect Effects

In Alternative 1, there would be no direct effect on recreation activities and use patterns. Indirect effects to recreation activities and their use patterns may occur in the long-term through untreated understory vegetation and unmanaged dispersed recreation camping. Stands with dense interfering vegetation would create less than ideal conditions for hunting, hiking, wildlife viewing and dispersed camping. Areas with natural wind damaged trees, debris, or downed trees would continue to hinder hunting, hiking, wildlife viewing, and dispersed camping activities. If dispersed campsites remain unmanaged, they may change in quantity and quality. Over time these campsites may develop resource concerns, which would need mitigation measures to protect soil and water resources.

In Alternative 2, direct effects to recreation activities and their use patterns may include a short-term disruption to hiking use on the Morrison Trail and the North Country National Scenic Trail and dispersed camping as a result of vegetation harvesting and the associated increased vehicle traffic on roads at or near treatment units and where dispersed campsites are located. Individual dispersed campsites may be unavailable while harvesting and/or reforestation treatments occur or for a short time period afterward (1-3

years) until vegetation is established. However, the proposed treatments in areas affected by beech bark disease would treat dense beech brush that impedes dispersed recreation in those stands.

Proposed road decommissioning (1.0 mile), new road construction (0.70 mile) and road reconstruction (10.2 miles) of both system and non-system roads could result in negligible effects to recreation activities and use patterns. The indicator of remoteness may temporarily shift to inconsistent in the Roaded Natural ROS setting as a result of the noise from proposed harvest activities. This would not be a long-term effect and would only last as long as the equipment is active in the area.

Vegetation treatments in Alternative 2 will result in more acres enclosed by fencing (176) than in Alternative 3 and more acres receiving other reforestation treatments which could result in less understory growth and may affect the recreation activities and use patterns of hunters and other dispersed recreation users.

Direct effects to recreation activities and their use patterns in Alternative 3 would be less than Alternative 2 because the three vegetation treatment units (449004, 449007, and 454022) that would have disrupted hikers on the Morrison Trail and the North Country National Scenic Trail would not occur. To help prevent sediment movement and improve water quality, potential road decommissioning (1.0 mile) and fewer miles of road reconstruction (8.0 miles) along with no new road construction of both system and non-system roads will increase opportunities for a more remote recreation experience.

The decreased vegetation and reforestation treatments in Alternative 3 will result in fewer acres enclosed by fencing (164) and less work in areas affected by beech bark disease. However, because less beech brush would be treated, Alternative 3 could result in a greater amount of understory growth that could impede the use patterns of hikers, hunters and other dispersed recreation users compared to Alternative 2.

Cumulative Effects

For Alternatives 1, 2 and 3, cumulative effects of the alternative would occur in the context of expanding private OGD. Effects to recreation activities and use patterns from current and reasonably foreseeable private OGD include a loss of solitude due to machinery noise and vehicle traffic, easier access due to additional roads, and a more modified environment due to additional roads and well pads.

Recreationists who are interested in an activity in preferred area, such as a favorite campsite, hunting area, wild berry picking patch, or fishing hole or those who follow a defined hiking trail, may see changed conditions along their route or may be displaced from that site or route.

I: Scenery

Analysis Framework

Scenic resource concerns are measured according to two indicators: the degree of change to the existing landscape character and the ability to meet or exceed the Forest Plan Scenic Integrity Levels (SILs) within the project area (USDAFS, 1995). Landscape character includes the existing vegetation, such as hardwood species and native and non-native conifers, as well as the forested plateau topography bisected by small streams and large rivers. Land uses, including areas of OGD, are also a part of the existing landscape character. Forest Plan SILs classify the scenic resource objectives across the forest in terms of minimally acceptable levels with the intent of achieving the highest integrity possible. Both indicators are guided by the methodology of the Scenery Management System (USDAFS, 1995).

The SILs within the Morrison Run Project Area are represented by a range of high, moderate, and low concern for scenery. High SILs are generally located within the viewshed of Concern Level 1 corridors including: State Routes 59 and 321 of the Longhouse Scenic Byway, the North Country National Scenic Trail (NCT), Morrison Hiking Trail, Rimrock Cross-Country Ski Trail, Wolf Run Marina, Kinzua Beach, Morrison Run, and the Allegheny Reservoir. Concern Level 2 corridors, with a secondary concern for scenery, are generally associated with a moderate SIL. Chappel Fork, a popular fishing stream, has a secondary concern for scenery.

Environmental Consequences

IM-15: Effects of alternatives on landscape character and Scenic Integrity Levels.

Direct and Indirect Effects

If Alternative 1 were selected, no proposed timber harvest or reforestation activities would take place and there would be no change in the current condition of the scenic resources except for those due to natural processes. The natural appearing forest would remain intact since natural stand development or disturbance processes usually have incremental effects in the short-term (USDA-FS 2009, pp. 19-23). Longer term changes may occur in the forest canopy and understory vegetation as a result of natural stand development or disturbance processes. These natural processes may be seen as pockets of dead and dying trees, large openings in the canopy and some stands with high densities that may lack age class diversity. Disturbances such as high wind events causing blow down may cause scenic impacts, however they remain consistent with the existing landscape character. If considerable differences between the existing and desired landscape character come to exist, it may be necessary to develop a transition strategy to meet the long term landscape character goals (USDA-FS 1995, p 5-9). Although these unmanaged changes could negatively affect scenery values, the natural appearing forest remains, in its evolving state, consistent with the landscape character.

High road densities associated with the OGD along the Longhouse Scenic Byway on SR321 and SR59 would continue to impact the scenery. However, the capacity to meet or exceed the SILs and to maintain the landscape character at locations within the project area would remain and not change, since these actions are due to private OGD activities.

If Alternative 2 was implemented, the proposed vegetation management has the potential to affect the character of the natural appearing forest vegetation; the greatest impact to the landscape character is from harvest activities that remove large numbers of trees creating openings of sunlight on the forest floor. Other treatments have less impact on the landscape character with benefits to scenery in the long term; these include: vista creation, and treatments such as herbicide application, site preparation, fencing, prescribed burning, release, planting and fertilizing to reforest and improve the stand.

Design features applied to minimize impacts to scenery should cause project activities to meet or exceed the SILs and maintain the landscape character in the project area.

Technical guidelines useful in developing these design features are found in the Allegheny National Forest Scenery Management Implementation Guide, a reference for managing scenery at the project level (USDA-FS 2009, pp. 7-8), and the National Forest Landscape Management Handbook series, specifically for timber (See FSM 2380.61 for current publication). Application of appropriate design features minimizes impacts from harvest treatments as seen from CL1 and CL2 corridors and meets or exceeds the SIL's as stated in the ANF LRMP standards and guidelines (USDA-FS 2007a, pp. 62-64).

If Alternative 3 was implemented, as in Alternative 2, the proposed vegetation management has the potential to affect the character of the natural appearing forest vegetation. In Alternative 3, 281 acres do not receive a shelter wood harvest and 3 miles of roads are not constructed or reconstructed. Design features associated with tree harvesting will not be applied to the following: 117 acres along the NCT, 17 acres along SR59, and 21 acres near SR321. As with Alternative 2, the application of appropriate design features will reduce impacts from harvest treatments as seen from CL1 and CL2 corridors and the scenery will meet or exceed the Forest Plan SILs.

Cumulative Effects

This project area is found in several sub watersheds on the Bradford Ranger District: the center of the Kinzua Creek (lower), Reservoir (lower) and Chappel Fork. For analysis purposes, the scenery cumulative effects boundary is bordered to the north by SR321 to include a segment of the NCT extending north of the project area to Sugar Bay. Acreage within the boundary totals 21,922 acres of NFS lands and 6,919 acres of private lands. This area captures the views when traveling the major and secondary travelways in the project area and the cumulative effects that impact scenery from both inside and outside the project area.

The time period considered for the cumulative effects analysis is from 2012 of this project proposal to 2032, or 20 years into the future. It covers the effects of past activities and the effects of the approved projects yet to be completed as well as proposed activities, and those in the reasonably foreseeable future. It provides for an overall view of the impact of vegetation management and OGD activities in combination with past, current and future project proposals. It is difficult to predict exactly where or what activities would occur in the future, but it is important to remember that future federal activities would be subject to the NEPA process to ensure that scenic quality is protected.

The desired condition outlined in the Forest Plan would guide choices and protect the land from cumulative effects as projects are proposed in the future. The standard practice on the ANF is to meet or exceed SILs by design, modification, or mitigation. Monitoring of the scenic resource is conducted every 5 years to ensure practices meet Forest Plan standards and guidelines. Past monitoring has demonstrated a 99% success rate in meeting or exceeding scenery standards (USDA-FS 1998, p. 60); this is expected to continue into the future.

The number of new OGD wells and accompanying roads would probably continue to increase in the cumulative effects analysis area. Corridors such as SR321 South, SR 59, and the southern slope along Sugar Bay have been substantially impacted by OGD in the past and continue to receive impacts. The rate of OGD can vary based on economics, technology, and supply and demand. The effect of expanding OGD on scenery is most evident along these CL1 travelways.

In summary, the cumulative effects resulting from past, present, and reasonably foreseeable future management actions would continue to impact the existing landscape character making it difficult to meet or exceed some of the established SIL. However, detrimental effects to scenery resources are not anticipated as a result of activities conducted by the Forest Service any of the alternatives.

J: Heritage

Analysis Framework

The boundary of the proposed Morrison Run project encompasses 58 inventoried cultural resources (17 prehistoric and 41 historic). The historic sites are primarily associated with past oil and gas or timber extraction, but four have been associated with camps, former residences, or homesteads. The prehistoric sites represent temporary, seasonal use of the uplands. Seventeen of the 58 cultural resources were previously evaluated for the National Register of Historic Places (NR) and 2 of these were determined to be eligible.

Cultural resources determined to be eligible for inclusion in the NR are identified as “reserve” and proposed activities are modified to avoid directly affecting the resource. Cultural resources that have not been evaluated for the NR are also protected. Cultural resources determined to be not eligible for the NR are not placed in “reserve” areas and their presence does not preclude normal resource management activities at the site.

The locations of stands proposed for treatment and other ground-disturbing activities comprise the area of potential direct effects (APE) to cultural resources. In the Morrison Run Project, only one inventoried cultural resource, a collapsed wood frame structure, is located within the APE of the proposed activities. However, this site was previously determined to be not eligible for inclusion in the NR.

The area analyzed for potential indirect and cumulative effects to cultural resources extends 400m (0.25mi) beyond the stands proposed for treatment. This area encompasses 23 inventoried cultural resources: 10 prehistoric and 13 historic. Previous evaluations for

inclusion in the NR determined one site (FS 0919030347, Pennzoil Powerhouse) to be eligible and five to be not eligible. The other cultural resources remain unevaluated.

IM-16: Effects of the alternatives on cultural resources.

Direct, Indirect, and Cumulative Effects

There are no anticipated direct or indirect effects of any of the alternatives on cultural resources in the Morrison Run project area. For Alternative 1, the lack of activities would not negatively affect cultural resources. For Alternatives 2 and 3, none of the proposed activities would be implemented in areas with known cultural resources that are eligible for the NR or for which eligibility has not been determined. Proposed activities in locations not previously surveyed for cultural resources will not be implemented until surveys assess the site and appropriate reserve areas are established. Indirect effects of the proposed activities could include increased access to cultural resources for recreationalists, but these effects are expected to be negligible and will be mitigated with additional resource protection if they occur.

Reasonably foreseeable activities that could affect cultural resources in the Morrison Run project area include natural processes (such as erosion and decay of structures), damage from recreationalists, and private oil and gas development activities. Proposals for private OGD will be reviewed to ensure that cultural resource sites are protected and future Forest Service activities will be designed to avoid or mitigate effects to cultural resources. Therefore, there are no anticipated cumulative effects to cultural resources from proposed or reasonably foreseeable activities in any of the three alternatives.

K: Economics

Analysis Framework

Activities on the ANF affect the local and regional economy (Elk, Forest, McKean, and Warren Counties). Timber management benefits these economies through direct employment as well as products and services that are provided to local industries and businesses. Priced commodities from the project are generated through timber products and the receipts from timber sales. 25% of the revenues generated by timber sales on the ANF are returned to Elk and McKean counties for support of roads and schools, whereas, Forest and Warren counties receive direct payments from Congress through the Secure Rural Schools Act. Remaining timber receipts are returned to the U.S. Treasury. The main non-priced, but still economically valuable, services include dispersed recreation opportunities such as hunting, fishing, hiking, and viewing scenery and wildlife.

The Forest Plan FEIS contains a history of the economic and demographic conditions within the four-county area (USDA-FS 2007b, pp. 3-399-410). Primary Forest Service related contributions from projects are related to forestry, logging, recreation, and manufacturing. OGD and support services also make large contributions to local economies. Additional details can be found in the Forest Plan FEIS (USDA-FS 2007a, pp. 3-412-413).

Environmental Consequences

IM-17: Effects of the proposed activities on providing goods and services.

Direct and Indirect Effects

For Alternative 1, there are no new proposed activities. Therefore there are no direct and indirect effects associated with this alternative. There would likely be negative effects on employment in timber and related industries and the local economy would forego revenues from additional saw timber and pulp products that would be produced in the proposed action alternatives.

For Alternative 2, proposed timber harvests would provide an economic benefit in the form of forest products to local industries, income and jobs for local purchasers and contractors, and returned receipts to Elk and McKean counties and the U.S. treasury.

For Alternative 3, some proposed timber harvesting activities from Alternative 2 were dropped or decreased in acreage (See Tables 2 and 3). Due to these modifications for Alternative 3, both costs and revenues are lower than those in Alternative 2. All of the treatments in the stands and portions of stands dropped under Alternative 3 (proposed under Alternative 2) are regeneration treatments that, due to the current condition of these stands, entail higher than average costs associated with reforestation activities.

The proposed management activities could negatively affect some forest users in the short-term, resulting in minor impacts on non-priced recreational activities and services.

Reforestation activities following timber harvests would include a suite of treatments that would be implemented in order to establish adequate seedling and saplings during and following timber harvests. The major costs associated with these treatments include site preparation, herbicide application, and release.

Comparison of the total costs, total returns, and net cash flow associated with the three alternatives suggests that Alternative 2 and Alternative 3 would have substantially greater economic benefits than Alternative 1 (Table 13).

Table 21: Economic costs and returns of Alternatives 1, 2, and 3.

Treatment Costs & Returns	Alternative 1	Alternative 2	Alternative 3
<i>Total Costs</i> Herbicide, fence installation, site preparation, wildlife habitat improvements, and project planning and implementation. Road costs are accounted for in timber harvest bid prices.	\$597,524	\$5,206,824	\$4,198,620
<i>Total Returns</i>	\$96,165	\$5,278,295	\$4,431,728

Revenues generated from timber harvest on NFS land. Based on seven-year forest-wide bid average (2004-2010).			
<i>Net Cash Flow</i> Total Return – Total Cost	-\$501,359	\$71,471	\$233,108

Current stumpage prices are based on a 7 year average (FY04-10) of live and dead sawtimber and pulpwood values from ANF timber sales data. These prices have been projected out through the life of the project area using annual percentage rates calculated from average stumpage price data of Northwestern Pennsylvania over the last 18 years (1992-2010). Costs are based on current ANF cost data and projected out using a 3% inflation rate.

Cumulative Effects

For Alternative 1, there are no new proposed activities. However, previously approved treatments and harvesting activities on private land not related to the Morrison Run project would continue to contribute to the local economy. The costs associated with this alternative include the total planning costs of this project and the costs associated with the five stands that have been previously approved to receive treatments. These previously approved treatments will provide economic benefits derived from timber harvesting activities, but these benefits are minor when taking into account the need for such activities by local industry. There would likely be negative effects on employment in timber and related industries and the local economy would forego revenues from additional saw timber and pulp products that would be produced in Alternatives 2 and 3. Additionally, implementing Alternative 1 would result in a decline in monetary returns to Elk and McKean counties for schools or roads and a decline in returns to the U.S. treasury over the cumulative effects analysis period.

By contrast, the management activities proposed in Alternatives 2 and 3 would provide additional and substantial benefits to the local economy through job creation or retention and revenue related directly and indirectly to timber contracts; primary and secondary wood processors; and those who harvest, haul, and process products. Implementation of Alternative 2 or 3 would continue to contribute monetary returns to Elk and McKean counties for schools or roads and returns to the U.S. treasury. The cumulative effect of this income in the context of other revenue sources is difficult to estimate, but Alternatives 2 and 3 clearly have a positive economic effect compared to Alternative 1.

A detailed economic efficiency analysis of Forest-level alternatives is presented in the Forest Plan FEIS (USDA-FS 2007a, Appendix B, pp. 78–98). On a proportional basis (according to land area), the cumulative effects on the local economy from proposed management activities in Alternatives 2 and 3 of the Morrison Run project is similar to the selected alternative Cm in the Forest Plan ROD (USDA FS 2007b).

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